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Inquiry in relation to the alleged influence of Colour on the radiation of non-luminous heat. By A. D. Bache, *Prof. of Nat. Philos. and Chem., University of Pennsylvania.*

In the following essay I propose to submit a few remarks upon a paper by Doct. Stark of Edinburgh, first published in the Transactions of the Royal Society of London, for 1833, together with an experimental inquiry into the alleged influence of colour on the radiation and absorption of *non-luminous* heat.

The experiments were commenced soon after the paper referred to, reached this country, and in them was adopted what seemed to me the less exceptionable of two methods used by Doctor Stark, which actually bear upon the question of the radiation of non-luminous heat. It was my intention to examine the matter more fully than had been done by Dr. Stark, and to procure a more satisfactory induction by experimenting on a considerable variety of substances. In this I had the kind assistance of my colleague, Prof. Courtenay.

While these experiments were in progress, the remarks of the Rev. Professor Powell, of Oxford, on the paper of Doctor Stark, appeared in the Edinburgh New Philosophical Journal. They confirmed me entirely in the view of the inapplicability of most of the experiments made by Doct. Stark, to the determination of the question of the influence of colour on the radiation or the absorption of heat.—Of this class were the absorption of heat, *radiant* heat being under-

stood, as tested by the inverse of Count Rumford's method for comparing the conducting powers of substances used for clothing; also, as tested by the effect of the heat from the *flame* of an argand gas burner, thrown by a mirror upon the bulb of an air thermometer, which was variously coated. Of the same class were the experiments on radiation, as tested by the method used by Count Rumford, as above referred to; the enveloping materials of the inner thermometer being wools of different colours, and coloured wheaten paste.

Not included in this class are the methods of ascertaining the rate of cooling of a thermometer of which the bulb was coated with different pigments, and of a glass globe filled with warm water and variously coated. I gave the preference to a modification of this latter method from the greater extent of radiating surface which may, without inconvenience, be commanded by it. The glass globe used by Dr. Stark, was one inch and a quarter in diameter; it was coated at different times with Prussian blue, red lead, and white lead, and in a room at 50° Fah., the fall, from 120° through 25 degrees, was in seventeen minutes, eighteen minutes and nineteen minutes.

I am constrained to differ from Professor Powell in his remarks upon the method just referred to, and, with great deference to so high authority would state why I consider them inconclusive. Professor Powell deems it necessary, or at least highly important to the determination of the question, that the radiating coatings of the globe should be equalized in respect to thickness, conducting power, density, &c., and refers to the experiments of Prof. Leslie, in which equal quantities of different radiating substances were dissolved and spread upon a surface, for comparison. That equal thicknesses of substances possessing different radiating powers should be compared together, seems to me to be disproved by the law established by Sir John Leslie's own experiments, namely, that radiation takes place not only from the surface, but in a thickness which is appreciable in good radiators. Thus when different coatings of jelly were applied, in succession, upon one of the sides of the cube in Prof. Leslie's experiments, the radiation increased with the thickness, up to a certain point. The effect of conducting power appears by this same experiment to be so small that an increase of the thickness in the bad conductor was actually more than compensated for by the increased radiating power. The influence of density on conducting power is well known, but the effect of either as controlling the radiating power of a substance, or as modifying it, is, I apprehend, yet to be appreciated. If these views be correct, and they are, I believe, founded upon the authorities so ably illustrated by Professor Powell in his report on radiant heat, to the British Association, the radiating powers of substances would not be rightly compared by equalizing their thicknesses upon a given surface, nor by equalizing their weights; but by ascertaining, for each substance, that thickness beyond which radiation does not take place. This will be placed in a clearer point of view in the sequel.

I do not however, consider the question at issue as the less difficult to determine, "no substance can be made to assume different

colours without at the same time changing its internal structure,"* and I believe with Professor Powell that "a very extensive induction is perhaps the only means open to us of ascertaining this, (the circumstances and properties wherein the coatings differ) considering how totally ignorant we are of the peculiarities on which their colour depends."

This *very* extensive induction I do not pretend to have made, but I think to have multiplied our experiments so much beyond the number made by Dr. Stark, as to be able to show that the supposed influence of colour on the absorption and radiation of heat remains yet to be demonstrated, and thus to prevent the admission as proved of what is more than doubtful.

The principal object was to select a considerable variety of pigments of the same colour differing chemically, and of different colours chemically allied, and, as subsidiary, to ascertain the effect of changes of colour produced by chemical means on different substances, and the effect of the material used to apply the pigment to the radiating body.

Several tin cylinders were procured, two inches high, and $1\frac{1}{2}$ in diameter, closed at the bottom, and having fitted to the top a slightly conical tube, to receive a perforated cork, through which to pass the stem of a thermometer. One of these vessels having been selected was coated in successive layers with a pigment. Water which was boiling in a porcelain capsule was then poured into the cylinder, which was suspended by means of two lateral hooks to cords attached to the canopy covering the lecture table. A thermometer introduced through a cork had its bulb nearly in the middle of the axis of the cylinder, and the thermometer by displacing part of the water assured that the quantity contained was the same in each case. A temperature was selected for beginning the experiments, sufficiently below that which the introduction of boiling water produced, to permit the rate of cooling to have become uniform, and one for ending which was high enough to prevent uncertainty from the slowness of the fall of temperature. The instant of the arrival of the mercurial column at any degree on the scale, and of its leaving the same, was noted, and a mean taken for the time of being at that temperature; a precaution which though superfluous in such experiments as these, will, I am persuaded, be found of importance where minute accuracy is desired in investigating the motion of heat. One of us observed the thermometer, the other noted the time by a pocket chronometer.

The time of cooling of the cylinder coated with colouring matter having been ascertained, an additional layer of the same substance was put upon it and the cooling again observed. The time of cooling diminished, of course, until that thickness was attained beneath which no radiation takes place, the time then slowly increased with each additional coat, the conducting power entering as an appreciable element into the rate of cooling. To show the decided nature of the

* Prof. Leslie's Essay on Heat.

results, I subjoin an account of one series towards the beginning of our experiments, when a want of experience rendered us cautious in applying the successive coatings, lest we should pass the thickness of determinate radiation. The necessity for thus feeling our way, rendered the labour of the experiments very considerable.

Cylinder coated with Prussian blue:

Time of cooling from 180° to 140° Fah.

1.	Thick coating,	$1011\frac{1}{4}$ seconds.
2.	ditto. added,	965
3.	Additional coat,	$910\frac{3}{4}$
4.	do. do.	$829\frac{1}{2}$
5.	do. do.	805
6.	do. do.	842

Another series, in a further advanced stage of our experiments is subjoined:

Cylinder coated with Litmus blue.

Time of cooling from 180 to 140° Fah.

1.	First thick coating,	985 seconds.
2.	Additional coat,	855
3.	do. do.	$827\frac{1}{2}$
4.	do. do.	$834\frac{1}{2}$

Besides the necessity of making several experiments to obtain a single result, it sometimes occurred that particular results required to be repeated for verification, when apparent discrepancies occurred; this was done to ascertain if they were real or not.

As it was obvious that the experiments must necessarily extend through a considerable time, during which the circumstances attending the cooling of the cylinders could not be expected to remain uniform, a standard for comparison was provided, in a cylinder of which the coating was not changed, and which was observed in regular turn with the other cylinders. At first a vessel without coating was used for this purpose, but as it was found liable to tarnish, it was substituted by a cylinder having a coating of aurum musivum, which was one of the smoothest and most uniform of the coloured substances used.—The numbers obtained on the different days from a mean of the trials made of the cooling of the standard cylinder, were applied to compare the results of one day with those of another. This assumes that the times of cooling of the different vessels would be affected proportionately by a given change in the circumstances of the experiment. This inability to preserve the circumstances constant is the real objection to this method, and one which most affects the certainty of the results.*

The following example shows the application of this method. The observed times of cooling of the standard cylinder, from 180 to 140° in two experiments on the 31st of October, were $969\frac{1}{2}$ and $968\frac{1}{2}$ seconds, mean 969. Three experiments on the first of November, gave 898, 892, and $893\frac{1}{2}$ seconds, mean $894\frac{1}{2}$.

* If the circumstances could be retained the same, three observations of the temperature at equal known intervals, would give a numerical expression for the radiating power of the coating.

Cylinder, number four, coated with cochineal (crimson) gave for the time of cooling from 180 to 140° on the 1st of November, $848\frac{1}{2}$. To compare this with a result obtained with the same cylinder on the 31st of October we have $894\frac{1}{2} : 969 :: 848\frac{1}{2} : x$, the equivalent number for October 31st, 916.3 seconds.

The results obtained with the same cylinder on different occasions of experiment, having been thus rendered comparable, the comparison of experiments with different cylinders, was effected by determining the time of cooling with the same coating upon different cylinders. Thus, numbers one and two having been coated with carbonate of lead, and their times of cooling through forty degrees having been ascertained, all the results with the various other coatings applied to these cylinders were comparable.

The numbers thus obtained will not be strictly proportional to the radiating power of the substance used, for the whole surface of the cylinders, including the ends, was not coated, and the contact of the air, and its consequent circulation exert a most important influence on the rate of cooling. This latter element has been shown by the experiments of Petit and Dulong, to be independent of the nature of the surface, and as the amount of uncoated surface remains constant, the greater effect of radiation will appear by the more rapid rate of cooling, and the less by the less rapid rate.

I proceed now to examine the degree of approximation which may be expected from the results of the experiments.

First, a comparison of different observations on the same day under the same circumstances of the cylinders, and nearly or quite the same as to the temperature of the room, will show how far accuracy is possible under the most favourable suppositions. The following table presents the results of this kind obtained during the entire series of experiments, with the ratios of the times of cooling:

Nature of Coating.	Time in sec's.	Ratio.	Nature of Coating.	Time in sec's.	Ratio.
Cylinder No. 3.			Cylinder No. 1.		
No coating.	$1281\frac{3}{4}$	1.000	Sulphuret of Antimony.	$849\frac{1}{2}$	1.000
	1300	1.014		$972\frac{3}{4}$	1.145
Chalk.	$909\frac{1}{4}$	1.000	do. additional.	$871\frac{1}{2}$	1.000
	$939\frac{1}{4}$	1.034	Coating on another occ'n.	$878\frac{1}{2}$	1.008
Prussian blue.	$909\frac{1}{2}$	1.000	Red lead.	$886\frac{1}{2}$	1.000
	$932\frac{1}{2}$	1.025		$894\frac{1}{2}$	1.009
Litmus blue.	$920\frac{1}{2}$	1.000	do. blackened	$911\frac{1}{2}$	1.000
	956	1.038	by sulphuretted hydrogen	$924\frac{1}{2}$	1.014

Cylinder No. 5.			Cylinder No. 4.		
Aurum Musivum.	892	1.000	Gamboge.	932	1.000
	893½	1.001		942½	1.011
	898	1.007			
			Chromate of lead.	938½	1.000
do. on another occasion.	937½	1.000		954½	1.017
	959	1.023			
			Vermilion.	845	1.000
do.	943½	1.000		850	1.006
	957	1.014			
			Sulphate of Baryta.	740½	1.000
do.	818	1 000		778	1.051
	820½	1.003			
			Cylinder No. 1.		
do.	850	1.000			
	860	1.012	No coating.	1396½	1.000
	897	1.055		1425½	1.020
				1445½	1.035
do.	851	1.000			
	872½	1.025	do. another occasion.	1313½	1.000
				1315½	1.002
			do.	1303	1.000
				1320	1.013

In the foregoing table, ten of the ratios are about 1.01 to 1, six 1.02 to 1, three 1.03 to 1, one 1.04 to 1, and two 1.05 to 1: it is therefore fair to infer that the single ratio of 1.14 to 1 results from an error of record or observation, and the table fully shows, that *under the same circumstances the results could readily be reproduced within about two per cent.*

Second. The correction for the altered circumstances of temperature of the room, &c., may be tested by comparing the experiments made with different cylinders having the same coatings on different days. In the annexed table is given the various results of this kind furnished throughout the series of experiments. The date is given in the left hand column, and applies to all the results on the same horizontal line with it. A comparison of the numbers in the columns marked ratio, and on the same horizontal lines will show how far the same reduction to a standard would have been given by different cylinders: in other words, how far the influence of currents of air, local temperature, and radiation from or to adjacent bodies might have interfered with the particular results.

Date.	No. cylinder.	Nature of Coating.	Reduced time of cooling,	Ratio.	No. cylinder.	Nature of coating.	Reduced time of cooling.	Ratio.	No. cylinder.	Nature of coating.	Reduced time of cooling.	Ratio.
Oct. 21	II.	Not coated.	1406	1.00	III.	Prussian blue.	914	1.00				
24			1422½	1.00			953½	1.04				
24		Do.	1422½	1.06		do.	953½	1.05				
25			1343½	1.00			910¾	1.00				
28	I.	Ammoniacal sulphate of copper,	853½	1.01	V.	No coating.	1342	1.02	V.	Litmus blue.	855	1.00
29			849½	1.00			1311½	1.00			827	0.97
31			862	1.01			1359½	1.04				
31	II.	Ammoniacal sulphate of copper,	930	1.13	IV.	Cochineal.	877½	1.03	V.	Aurum Musivum.	968½	1.08
Nov. 1		(not the same as above.)	826½	1.00			848½	1.00			894½	1.00
1	II.	Ammoniacal Sulphate of copper,	808½	1.00	IV.	Chromate of lead.	907	1.00	V.	Aurum Musivum.	894½	1.00
6		(not the same as above,)	831½	1.03			944½	1.04			948½	1.06
6	I.	Red lead.	890½	1.00	IV.	Alkanet.	980½	1.00	V.	Aurum Musivum.	948½	1.00
11			912¼	1.02			926¾	0.95			950¼	1.00
15	V.	Aurum Musicum.	865½	1.06	VI.	Black lead.	870	1.09				
17			819¼	1.00			799	1.00				
17	III.	India Ink.	788½	1.00	V.	Aurum Musivum.	819½	1.00				
18			836¼	1.06			869	1.06				
20		India Ink.	834	1.00	V.		816	1.00				
21			890	1.07			861½	1.06				

Of the ratios thus brought into comparison it will be found that in one case the results are identical, in four others that they differ one per cent., in two others two per cent., in four others three, in one

four, in three five, in two seven, and in one ten per cent: omitting this latter the accordance is much less satisfactory than was shown by the former table, and the average amount of error is nearly four per cent.

Having now shown the probable limits of accuracy in the experiments, I proceed to compare together the reduced times of cooling of the same cylinders with different coatings. In the table will be given the observed time of cooling through forty degrees, and the time of cooling of the standard, from whence the reduced times are deduced. As the colours of the substances were not in all cases what would be expected, the colour is designated in a separate column.

Cylinder No. 1, variously coated.

Nature of Coating.	Colour.	Date.	Observed time of cooling.	Time of cooling of standard.	Reduced time of cooling.	Remarks.
			sec'ds.	sec'ds.	sec'ds.	
Carbonate of lead.	White.	Oct. 24	864	1014	864	Smooth.
Vermilion.	Red.	25	806	937	872	Smooth, with minute cracks.
Golden Sulphuret of Antimony.	Brown, nearly black.	31	868.5	969	909	Rough, peels easily
Red Oxide of lead.	Orange.	Nov 6	890.5	948.2	952	Smooth.
do. additional coat		11	932.7	950.2	995	For comparison with following.
Do. blackened by hydro sulphate of potas-a.	Brown.		917.8	"	966	Red shows thro'.
Plumbago.	Black.	17	787	819.2	974	Uniform, b ut not glossy.
Gamboge.	Olive.	20	808.7	816.	1005	Smooth, but in streaks.

The radiating power being greater, as the time of cooling is less, we have the order of radiating power of the different coloured substances, as follows: white, red, brown, orange, black, green. Omitting in this enumeration the blackened surface of the red oxide of lead, which had passed in thickness the maximum radiating thickness, and is only comparable with the result which precedes it. The change of colour effected by changing the surface to sulphuret of lead, (black or rather brown) increases the radiating power in the ratio of 1.05 to 1, which is within the average of error.

The following results given in order of time, and reduced by the standard, were obtained with cylinder No. 2.

Nature of coating.	Colour.	Date.	Observed time of Cooling.	Time of cooling of standard.	Reduced time of cooling.	Remarks.
			sec'ds.	sec'ds.	sec's	
Ammoniacal sulphate of copper.	Blueish green.	Nov. 6.	808.5	948.2	856	Streaked and peels off rough.
Indigo.	Blue.	11	928.	950.2	990	Very smooth.
Carbonate of lead.	White.	14	883.2	956.	937	Smooth.
do.		15	910	856.5	982	For comparison with following.
do. blackened by hydro sulphate of potassa.	Black.	15	874		944	
Per oxide of Manganese.	Darkbrown	18	747	869	872	Uniform but not smooth.

The variety of colour is here small; the radiating powers rank, blueish green, dark brown, white, blue; omitting the second experiment with the carbonate of lead which is only comparable with the one in which the surface was blackened by hydro sulphate of potassa. Comparing these two results the change of surface appears to have increased the radiating power in the ratio of 1.04 to 1.

The coatings applied to cylinder No. 3 were more varied than those of either of the foregoing.

Cylinder No. 3.

Nature of coating.	Colour.	Date.	Observed time of cooling.	Time of cooling of standard.	Reduced time of cooling.	Remarks.
			sec'ds.	sec'ds.	sec's	
Carb. of magnesia.	Yellowish white.	Oct. 11	859.5	862	1011	Rough, in specks projecting.
Carbonate of lime, (chalk)	White.		879		1034	do.
Carbonate of lead.	White.		877		1032	Smooth and somewhat shining.
Prussian blue.	Blue.	25	805	937	871	Rough.
Litmus.	Blue.	31	831	969	870	Not uniform.
Bichromate potassa	Reddish brown.	Nov. 1	854	894.5	986	Streaked and not smooth.
Alkanet.	Crimson.	11	926.7	950	989	Uniform.
Do. rendered blue by potassa.	Blue.		938.2		1001	
India ink.	Black.	17	776	819	959	Not smooth,
do.		18	836	869	976	More uniform, (mean 6 9 7)
Carbonate of lead in oil of lavender.	White.	21	843.5	862	992	Uniform, but not glossy on surface
Do. blackened by hydro sulphate of potassa.	Black.		850		1000	

The effect of changing the crimson of alkanet to a blue was apparently to decrease its radiating power about one per cent, or the change of colour in reality did not alter the power. The carbonate of lead lost also slightly, or rather was not affected, by the change not only of its surface, but of a considerable part of its mass, for the oil of lavender having evaporated, the hydro sulphate of potassa penetrated the coating. The substance by means of which the coating was applied, seems not to have sensibly affected the radiating power; the carbonate of lead applied with gum differing in radiating power but four per cent. from that applied with oil of lavender.

The colours rank from the foregoing table, blue, two varieties; black, brown, crimson, white, black, blue, white, three varieties. There is no certainty that the litmus and alkanet, changed to blue by potassa, were originally the same in colour. The surfaces were very different in regard to uniformity and smoothness; the alkanet was perfectly uniform, but not at all glistening; it may be described as of a uniformly minute roughness. In this table, we have the greater number of whites at the bottom of the scale of radiation, and of blue and black at the top; but this is all that can be said, for a white, a

black, and a blue, are in close proximity near the middle of the scale.

The results, with cylinders Nos. 4 and 5, were few in number. They are subjoined.

Cylinder, No. 4.						
Cochineal,	Crimson,	Nov. 1	8485	894.5	962	Not uniform.
Chromate of lead,	Yellow,	6	931.7	948.5	996	Very smooth and uniform.
Bi-sulph't. of mercury, (vermilion)	Red,	11	843.7	950.2	888	Uniform & smooth.
Sulphate of baryta,	White,	15	759.2	865.2	889	Rough.
Ditto,	„	21	829	861.7	975	Smooth, freshly precipitated.
Cylinder, No. 5.						
Gamboge,	Olive,	Oct. 29	845.5	934	917	Smooth.
Bi-sulphuret of tin, (aurum musivum,)	Yellow,	31	969	969	1014	Very even.

The order from cylinder No. 4, is red, white, crimson, white, yellow; the influence of the roughness of surface is here plainly shown, by which the place of the white material, sulphate of baryta, is entirely changed; this is a quality difficult to appreciate, and yet here we find it exceeding in influence any other property of the coating.

A review of these results will show that we have been able to establish, among the separate series, no order of colour; we have the different orders as follows:

From No. 1.	No. 2.	No. 3.	No. 4.
White,	Green,	Blue,	Red,
Red,	Brown,	Black,	White,
Brown,	White,	Brown,	Crimson,
Orange,	Blue,	Crimson,	White,
Black,	White to black, an increase of 4 per cent. in radiating power.	White,	Yellow.
Green,		Black,	No. 5.
White to black, an increase of 3 per cent. in radiating power.		White,	Green,
		No effect from changing white to black, or purple to blue.	Yellow.

A more satisfactory comparison, in respect to the number of substances employed, will be had by using the means, heretofore described, for comparing together the results obtained with different cylinders. For example, Nos. 1, 2, and 3, were each coated with carbonate of lead, and through the numbers given by these coatings, those found for the other coatings can be compared; Nos. 1 and 4 were coated with vermilion, and Nos. 1 and 5 with gamboge.

The following table presents the comparison, the substances being arranged in the order of their radiating powers.

Number.	Nature of Coating.	Colour.	Number of Cylinders.	Date.	Time of Cooling. sec's.	Remarks on Surface.
1	Litmus blue,	Blue	No. 3	Oct. 31	728	
2	Prussian blue,	Blue	3	25	729	Rough.
3	Ammoniacal Sulphate of copper,	Greenish blue	2	Nov. 6	789	Rough.
4	Per-oxide of manganese,	Brownish bl'k	2	18	804	Not shining, but uniform.
5	India ink,	Black	3	17	804	Not smooth.
6	Bi-chromate of potassa,	Brown	3	1	810	Streaked, streaks smooth.
7	India ink,	Black	3	18	817	Smooth.
8	Alkanet,	Crimson	3	11	828	Not shining, but uniform.
9	Carbonate of lead in oil of lavender	White	3	21	830	Smooth, not shin'g
10	Sulphuret of lead,	Black	3	21	837	
11	Alkanet blue,	Blue	3	11	838	
12	Carbonate of magnesia,	White	3	Oct. 13	846	Rough.
13	Carbonate of lead in gum,	White	1	24	864	Smooth.
14	Carbonate of lime,	Dingy white	3	11	865	Medium.
15	Vermilion,	Red	1	25	872	Smooth.
16	Sulphate of baryta,	White	4	Nov. 15	873	Rough, blueish white.
17	Golden sulphuret of antimony,	Brown	1	Oct. 31	909	Smooth, in streaks
18	Indigo,	Blue	2	Nov. 11	912	Smooth.
19	Cochineal,	Crimson	4	1	944	Smooth.
20	Red lead,	Orange	1	6	952	Smooth.
21	Sulphate of baryta,	White	4	21	957	Medium.
22	Plumbago,	Black	1	17	974	Not shining, but uniform.
23	Chromate of lead,	Yellow	4	6	977	Smooth.
24	Gamboge,	Olive green	1	20	1005	Smooth, in streaks.
25	Bi-sulphuret of tin,	Yellow	5	Oct. 31	1085	Smooth.

The results thus exhibited are decidedly unfavourable to the specific effect of colour in determining the radiating powers of bodies. Blue is above black at the beginning of the table, and occurs again in the eighteenth place. Although the first seven numbers are blue or black, the ninth, tenth, eleventh, and twelfth, are white, black, blue, and white, respectively. Red occupies the eighth and nineteenth places, and then an intermediate one, namely, the fifteenth. White is in the greater number of cases in the middle part of the table, ranging close to black.

The alleged advantages of dark clothing during cold weather, thus seems to have been too hastily inferred; and it appears that, provided

the person is not exposed to the sun, the particular colour of the clothing is not of real importance.

If colour is not a determining quality, neither does roughness appear to be so, for though generally the smooth surfaces are lower on the list, this is not universal. The rough sulphate of baryta is lower on the list than the smooth carbonate of lead. Plumbago occupies a low place, and India ink a comparatively high one.

The best radiators do not appear to belong to any particular class of bodies; litmus blue and Prussian blue are side by side, while sulphuret of lead, and the bi-sulphuret of tin, are fifteen numbers apart.

If the results be admitted as decisive of the radiating powers of the bodies used, they show that each substance has a specific power not depending upon chemical composition, nor upon colour. I do not claim to found such a conclusion upon the experiments; their object has been before stated, and if they shall prevent the introduction of an inference from an imperfect induction, as a law of science, the labour bestowed upon them will be amply recompensed.*

FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

Suggestion of Methods for Preventing Annoyance from Sparks issuing from the Chimneys of Locomotive Engines. *By* ERSKINE HAZARD, *Civil Engineer.*

TO THE COMMITTEE ON PUBLICATIONS.

GENTLEMEN:—Having experienced great inconvenience from the sparks, dust, and smoke, of locomotives, when traveling on rail-roads, I have thought of several ways of obviating the annoyance, and take the liberty of suggesting the following, which, if you think them worth a trial, you will please publish in your valuable journal.

Fig. 1

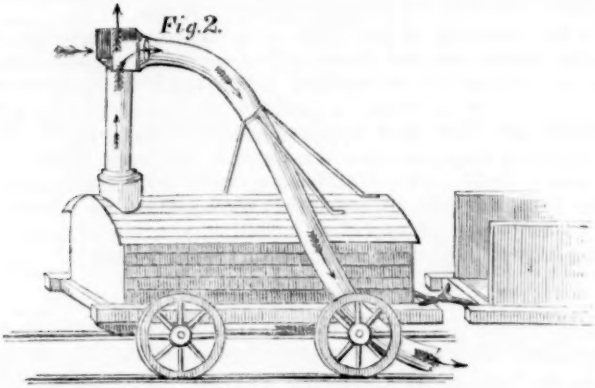
Fig. 1 is a plan to catch the sparks. It consists of a cylindrical cap of sheet iron, closed at the upper end, inverted over the top of the chimney, and extending say ten or twelve inches down its sides, to be made as much larger in diameter than the chimney, and of such length as will leave sufficient area for the smoke to pass out between the cap and chimney. The cap is to be supported by braces riveted to the chimney and cap. A sheet iron case, of still larger diameter than the cap, surrounds the upper part of the chimney for say four feet, and is closed at the lower end.

The course of the smoke would be turned downward and outward by the cap, and the sparks, having some weight, would continue their course into the reservoir formed between the chimney and case, (which would be rendered nearly a vacuum by the heat,) while the smoke would again rise into the atmosphere between the cap and the outer case. The diameter of the case will not require to be much greater than that of the cap, from the well known fact of the area of circles increasing in proportion to the squares of their diameters.

* The scientific reader need not be reminded that these remarks do not bear upon the radiation or absorption of heat accompanying light.

Fig. 2 is a portion of a square box of sheet iron, placed on top of the chimney. The top and front side of this box are entirely open. At the back of the box, a conical pipe is inserted, which passes backward and downward, so as to come nearly to the ground, either between or outside of the tracks of the rail-road.

Fig.2.



When the engine is at rest, the smoke ascends, as usual, through the open top of the box, but as soon as the engine is in motion, the current of air through the back of the box and pipe, will deliver the sparks and smoke on the ground, and they would, probably, not rise in time to annoy the passengers.

Fig.3.

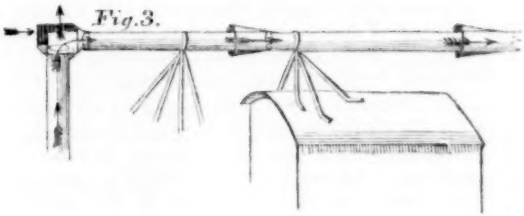
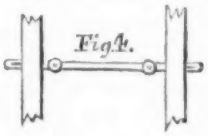
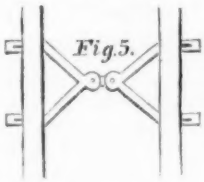


Fig. 3 is a different arrangement of the pipe, by which the sparks and smoke may be delivered at the back of a long train of cars. The pipe attached to the chimney bore passes backward, and enters the conical end of the pipe on the tender, which in its turn enters the pipe on the car, and so on to the end of the train. The conical ends of the pipes should be wide enough to accommodate the bends of the road, and should be supported by props at the fronts of the cars, while the hinder ends of the pipes are supported by the cones of the succeeding, the last pipe having two supports. To admit of this arrangement, it will be necessary to change the mode of attaching the

cars to each other, by substituting stiff bars for the chains now commonly used, and making the connection by a pin joint on each end of the bar, (Fig. 4,) at the centre of the cross pieces of the car frames, as has been long practised at Mauch Chunk. It will not be necessary that the pipes should fit each other accurately, as the motion of the cars will make the current inward at each cone. If the pipe has two supports, as the one at the engine would probably have, it would require the connecting bar between the carriages to be very short, as Fig. 5, the joint in the pipe to be immediately over it.





I shall be pleased if any of the rail-road companies should make a successful experiment from these suggestions.

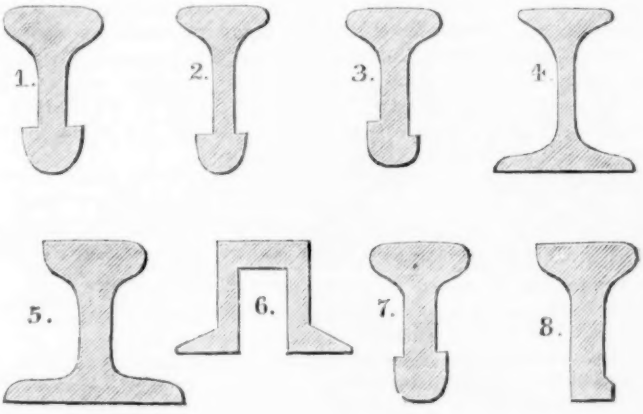
ERSKINE HAZARD.

Philadelphia, September, 1835.

Sections of Rails used in the United States. *By* J. C. TRAUTWINE, *Civil Engineer.*

TO THE COMMITTEE ON PUBLICATIONS.

GENTLEMEN,—I send for insertion in the Journal of the Institute, transverse sections of eight varieties of parallel rails, employed on different rail-roads in the United States. The figures are drawn to a scale of one-fourth the full size, and accompanied by a statement of the weights, per lineal yard.



		Weights.
No. 1.	Columbia and Philadelphia, per yard,	41¼ lbs.
2.	" " "	33 "
3.	Germantown and Norristown, "	39 "
4.	Camden and Amboy, "	39¼ "
5.	Boston and Providence, "	54 "
6.	Wilmington and Susquehanna, "	40 "
7.	Alleghany Portage, "	40 "
8.	Boston and Providence, "	40 "

On Steep Grades for Rail Roads. By A. C. Jones.

TO THE COMMITTEE ON PUBLICATIONS.

Gentlemen:—In reading the reports of new Rail Roads that are being located, I have been surprised to see that Engineers propose grades of one hundred feet to the mile, and state that locomotive engines will overcome them with ease;* this being only the case when the greater part of their load has been left behind, or when the assistance of another engine is afforded to aid the first one up the grade.

Inclined planes, with stationary engines, are serious evils on rail roads, and where the plane is such that it requires the power of another locomotive to surmount it, the evil is only lessened: far better would it be for the stockholders, if the engineer should lengthen the road five miles, than to make a grade over thirty feet to the mile.—Where the carrying trade is all one way there is an exception to this remark, but then such grades are not consistent with safety.

It will be admitted by all, that the state of the water in the boiler of a locomotive engine is of considerable importance, and any person who has seen locomotive engines with boilers on Mr. Stephenson's plan, will not have failed to notice the great change in the height of the water in the boiler, in passing from a level down a grade of twenty-five feet to the mile. This is easily accounted for, by the angle which the grade makes with the horizon, and as the water in the boiler will find its level, it flows to the lowest end: moreover the centre of gravity being thus moved forward increases the weight on the springs in front, which are straightened in proportion, while part of the weight being removed from the hind part of the carriage the elasticity of the springs will raise it up, and the cap of the fire box, and part of the flues, are liable to be left dry.

It may be urged by some, that the ebullition in the boiler will keep the flues wet; but as it is known, that in descending a grade exceeding one hundred feet, no steam will be required, and there being consequently no draught, the water will not be in violent ebullition.

Respectfully yours,

A. C. Jones.

Portsmouth, Va. Aug. 20th, 1835.

* I have not seen the official account of the experiment of ascending the one hundred and seventy-six feet grade on the Baltimore and Ohio rail road; but it is not prudent to take a single experiment as a basis by which to form grades.

FRANKLIN INSTITUTE.

Monthly Conversation Meeting.

The first conversation meeting of the Institute, for the season, was held at their Hall, September 25th, 1835.

Mr. Franklin Peale exhibited a model of a coining press devised by him, after a visit of inspection abroad. The toggle joint is substituted for the screw in this press. Mr. Peale described the mechanism of his press, gave a general account of the methods of coining in use in England, France, and Germany, and of the improvements of which our own methods are susceptible.

Mr. John H. Schrader showed a slide rest made by him, and having both a rough and a fine adjustment for centering the article to be turned.

Upon the table was a specimen of the Ailanthus tree, the valuable properties of which were described by the President of the Institute, in the September number of this Journal.

Messrs. Carr & Lunt exhibited a very ingenious machine for tenoning the spokes of wheels, invented by Mr. Wm. Gerrish, of Portsmouth, New Hampshire.

Prof. A. D. Bache explained a simple and portable apparatus devised by Prof. Courtenay and himself, for oscillating a magnetic needle, to obtain the horizontal intensity in a rarified medium.

Mr. Turner Risdon sent for examination a tool used by the makers of coach bodies, for forming grooves for the insertion of pannels. This tool was simple, and judged to be well adapted to the intended purpose.

Committee on Science and the Arts.

Report on Mr. D. H. Hackman's Mathematical Chart.

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania for the promotion of the Mechanic Arts, to whom was referred for examination, a Mathematical Chart, designed by Mr. D. H. Hackman, of Pittsburgh, Pennsylvania, REPORT:—

That the said chart is intended to present to the eye, *first*, a distinct view, in figures, of the most important lines, surfaces, and solids, treated of in works of practical geometry and mensuration, with the name of each conspicuously exhibited, and the different figures variously coloured, to avoid confusion in studying the separate objects contained in the plate; *second*, a concise definition, in language, of the several matters embraced in the chart, and a series of the most useful problems in mensuration, trigonometry, surveying, &c., with tables of weights and measures, and a variety of practical instructions relating to subjects with which mathematical calculations are connected.

The committee do not think it necessary to make any remarks upon the utility of presenting to the eye, and in the most clear and intelligible manner, the important truths which this chart is intended

to illustrate, since all who have *well* learned these truths, must *know* the value of such an exhibition, and all who have acquired but an imperfect knowledge of them, must have *felt* the want of some similar method to aid in their acquirement, or recollection.

The design of this chart appears to have originated with the author, and, though it relates to things long known and familiar, is not the less entitled to approbation, since it gives a facility and satisfaction in the acquisition of a department of knowledge, often rendered difficult and repulsive by the manner in which it is exhibited to the student.

The language of the definitions, axioms, and rules, is clear and expressive, and the order in which the subjects are presented is, in general, that of their dependence upon each other.

It is believed that schools, private students, and practial men, will be alike benefitted by having at hand a copy of this chart.

By order of the committee.

WILLIAM HAMILTON, *Actuary.*

September 10th, 1835.

AMERICAN PATENTS.

LIST OF AMERICAN PATENTS WHICH ISSUED IN APRIL, 1835.

With Remarks and Exemplifications, by the Editor.

1. For *Regulating the Height of Water in Steam Boilers;* Jesse Fox, Lowell, Middlesex county, Massachusetts, April 2.

"This machine, apparatus, or pump, resembles a common force pump, having one valve, a cylinder, piston, or plunger, one inch in diameter, and making a stroke of four inches. It is attached to the boiler at the water line, and is kept in constant operation, and fills from, and discharges itself again into, the boiler; it operates upon the supply pump. When the water in the boiler is below this pump, or apparatus, it fills with steam from the boiler, and the valve between the pump and the boiler being shut, and pressure applied to the piston, or plunger, the steam in the pump is compressed; by taking advantage of this circumstance, the supply pump is put into gear, or motion, and continues until the water in the boiler rises to the pump, when it fills with water, and although pressure is applied upon the piston, or plunger, water being incompressible, it will not yield, by which circumstance the supply pump is thrown out of gear, or stopped; thus stopping and starting, the water in the boiler is kept constantly at the point, or nearly so, to which the apparatus is attached."

The part of the description following the foregoing quotation, refers by letters to a drawing of the apparatus, after which there is the following claim.

"What is claimed as new, is the application of pressure to a portion of the steam and water of steam boilers, insulated or taken from a particular point in the boiler, for the purpose of supplying the boiler with water, or ringing a bell, or giving an alarm, when the water in

the boiler has fallen to a particular point, and such apparatus or machinery as is above mentioned, and so much and such parts of the machinery and apparatus aforesaid in combination, as is necessary and proper for effecting the purpose aforesaid."

If this apparatus would answer the proposed purpose, so also would several contrivances which have preceded it; but we are convinced that all plans must fail which depend upon the assumption that water highly heated in a boiler, and from which steam is escaping at every stroke of the piston to supply the cylinder, is in a quiescent state, like cold water in a reservoir. What engineer does not know that water may be blown into the cylinder through the steam pipe, when, at the same time, there is not a drop too much in the boiler?

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2. For *Apparatus for Regulating the Temperature of Rooms, producing an Alarm in case of Fire, &c.:* Bradford Seymour, and Squire Whipple, Utica, Oneida county, New York, April 2.

The modes employed depend upon the expansion of mercury by heat, or the bending of a compound bar, the two sides of which are of different metals, expanding differently by the same increment of temperature. When mercury is used, it may be confined in a tube, and made to raise a float of wood, which, at a certain elevation of temperature, will cause an alarm bell to ring. A similar effect, it is manifest, may be produced by the compound bar.

"What we claim as our own invention, and not formerly known in the above described principle, instruments, and apparatus, are the application of the expansive force exerted by bodies on the application of heat, to the purposes of a fire alarm. And the form and arrangement of the different kinds of apparatus and instruments herein above described, for such application, and for any other purpose to which they may be applied."

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3. For a *Thrashing Machine;* Luther Carman, Oxford, Oxford county, Maine, April 2.

We have in the specification of this patent, a long description of a thrashing machine, and a horse power by which it is to be driven, they being treated as though they constituted but one machine; but, apart from this, what are represented as novelties, merit this character about as perfectly as would a claim to drive four nails, where three had been formerly used; it consists entirely in the peculiar manner of putting the parts together.

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4. For a *Pump*, denominated the Tread Pump; Heinrich Bachmann, an alien, who has resided two years in the United States; Lancaster, Lancaster county, Pennsylvania, April 2.

We are told that, "by the application of this machinery, the long desired object is attained, to raise, with a trifling exertion of power, a much larger quantity of water in a shorter time. This is effected by substituting, in the place of the common pump handle, a pendulum fastened to the middle of an iron axletree, on one end of which a

double treading board is fixed, and on the other end a cog wheel, moving in a rack, which is fastened to the lower end of the lever beam. By treading the board, the pendulum is put into a swinging motion, which causes the cog wheel to move in the rack, and to draw the lever beam up and down."

"By means of this invention, it is possible to draw up water out of the *deepest* well, in large quantities, and with perfect ease."

A piston is described and figured, and its employment made a part of the invention claimed, but for what reason we are unable to ascertain, as its general construction is not new, and no particular parts are pointed out by the patentee as possessing this character.

This pump, we are informed, may be made to answer the purpose of a fire engine, where water is not to be raised "more than twenty feet higher as the spot where the pump stands." No account whatever is taken of the depth of the well, or reservoir, from which the water is to be obtained, a circumstance worthy of some consideration. But the fact is, that the whole affair manifests a want of acquaintance with the subject of hydraulics, as is evinced by the initiatory declaration that, by the method laid down, water may be obtained in large quantities, from the deepest well, with a trifling exertion of power. In the drawing which accompanies the specification, a man is represented as treading the double board, much at his ease, and he might as well "stand at ease," as to attempt, by his individual power, however applied, to draw water in large quantities from one of the deepest wells. A man has the power to raise a given weight to a given height, in a given time, and it is not possible, by any mechanical arrangement, to enable him to do more; his power may be applied disadvantageously, and, in consequence thereof, a portion of his efforts be wasted; to prevent which, the skill of the machinist is called forth; but beyond this point, if he have skill, he does not attempt to go. The tread board, as proposed in the present patent, has neither the merit of novelty, nor of being the best mode of applying power, and we have so often of late had to decry the schemes for applying the power of the pendulum, that we do not think it necessary to repeat the objections to its use, or again to insist upon the fact that it gives no power, but actually destroys a portion of it.

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5. For a *Straw Cutter;* John Deakyne, Petersburg, Dinwiddie county, Virginia, April 2.

The things claimed in this machine are, "*First.* The method of obtaining the bearings for the feeding rollers, by lapping the sides of the box on the sides of the mouth-piece, the axes of the rollers resting on the mouth-piece, and working against the ends of the side-boards. *Secondly.* The method of fixing the cutters to the arms of the fly-wheel, by securing them to pieces of iron, and then securing the pieces of iron to the arms of the fly-wheel by screws, or in any manner that will permit them to be movable on the arms." It will be seen that these claims refer to matters of arrangement only, the general construction of the straw cutter not differing from such as are now in use.

6. For an improvement in the *Grist Mill*, applicable also to the grinding of paint and plaster; Cephas Manning, Littleton, Middlesex county, Massachusetts, April 2.

This is another portable mill for grinding grain, &c., in which is claimed, "A new and useful method of arranging and supporting the stone of a grist mill, by which the upper stone shall be stationary, and the lower stone shall be the runner, or revolving stone. A new and useful method of dressing the stones of a mill by curved grooves, hereinafter to be described. A new and useful method of supporting, and of preserving the parallelism of, the runner."

As the lower stone has repeatedly been made the runner in such mills, the doing this cannot become the subject of a valid claim, and we do not see any thing peculiar in the mode of effecting it, as described by the patentee. The manner of dressing the stones is by laying out the furrows in curved lines from the eye, or centre, to the periphery; the curves to vary according to the velocity intended to be given to the stone, &c. The lower stone is to be made fast to the vertical shaft by passing screws through four arms upon which its under side rests, these screws serving also to regulate its parallelism.

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7. For a *Cooking Stove;* Anthony Abbott, Portland, Cumberland county, Maine, April 2.

There is no claim made to any part of this stove, nor do we know of any thing in it which ought to be claimed. The whole of it, we are told, is to be of cast-iron, with the exception of the "coal oven," meaning an oven with an arched top, which is to be double, that the flame may play round it. The description is obscure, but the drawing shows the form intended to be given to the stove, and this, we believe, is in some points new; otherwise we should be at a loss to give this character to any part of it.

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8. For a *Papillary Shield;* William Buxton, Woburn, Middlesex county, Massachusetts, April 2.

A circular stock of wood, or ivory, is to be turned, about two inches in diameter where it rests upon the breast; it is perforated in the centre to receive the nipple, and is surmounted by a gum elastic sheath, or teat, for the mouth of the child, which slips over a piece of metal, covering the top of the stock.

"The invention described has not, to the knowledge of the inventor, been used in the United States, or any other part of the world; he has seen a shell of pewter, with a teat cut from a calf attached to it, for the child's mouth, but which answers no good purpose, producing only disgusting effects; with this instrument, which has never been patented, to the knowledge of the petitioner, he claims not to interfere."

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9. For *Wheels and Axletrees;* Aaron Hale, Boston, Massachusetts, April 2.

The rim and spokes of this wheel are to be of wrought iron; the

rim is to be drilled and tapped, to receive the ends of the spokes, upon which screws are cut. The spokes are to be confined to the hub between face plates, which pass over each end of a cart hub, and are confined together by screws. One half of the spokes are to be confined at one end, and the others at the reverse end, forming counter braces to each other; there are excavations on the face plates, and on the ends of the hub, to receive and clasp the spokes. "Now, what I claim as my invention and improvement in the above described wheel, is the arrangement and the fastening the spokes into the felloe, by screwing them in."

The screwing of felloes and spokes together in this way is not new; it has been done, and the inner ends of the spokes have had the hub cast upon them; but they have become loose and shackling, and we very much doubt the permanence of those made and secured on the plan of the patentee.

The axles are to have a groove cut along their upper sides to receive oil, the formation of which groove constitutes the claim in this part of the invention. To the drawing there are no "written references."

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10. For a *Combined Rotary and Stationary Spindle;* Charles Jackson, Stephen S. Potter, and John Miller, Providence, Rhode Island, April 2.

This spindle, as the name indicates, is to be divided into two parts; the upper portion, which carries the flyer, revolves in a cast-iron rail at the top of the spindle, there being a whirl on it just below the rail, and immediately below this the flyer forks off; the spindle descends about an inch within the flyer, and tapers to a blunt point. It is perforated through the centre, at top, and laterally under the whirl, to allow the yarn to pass through, and to the curl of the flyer.

The stationary spindle is capable of sliding up and down in cast-iron cross bars; it is lowered when a spool is to be put on, and has a contrivance for keeping it in place when raised. It is perforated at its upper end to receive the tapered end of the revolving spindle, the point of which rests against the bottom of the perforation. The upper spindle is kept from falling by a tightening wire, which crosses the frame under the whirl.

"We claim as our invention,—

"1st. The method of spinning or twisting yarn, thread, or roving, with a rotary spindle, pointed at its lower end, and bearing on its point at the bottom of a hole in the upper end of a stationary spindle.

"2nd. The application of a tightening wire in the manner above described, to support the rotary spindle when detached from the stationary spindle.

"3d. The application of a collar with a handle, and the slit in the rail to support the stationary spindle.

"4th. The manner of removing the stationary spindle from the slit in the rail, for the purpose of putting on and taking off the bobbins."

11. For a *Truss for the Cure of Hernia;* J. W. Hood, M. D., late of Clarke county, Kentucky, but now of the city of Philadelphia, April 2.

The drawings illustrative of this improvement are extensive, and the specification of great length; the apparatus has been employed with extraordinary success, producing a radical cure in numerous cases, some of which we have witnessed; the patentee is about bringing forward some improvements, when we will furnish an epitome of the whole system; at present, we give the claims only, which are appended to the specification of the above named patent.

"Although I have, in the foregoing specification, designated the precise number of pads which I successively employ in the various species of hernia, and have given particular admeasurements for certain belts used by me, it will be manifest that in these and other particulars, I do not intend to limit myself by the terms employed, but in all cases to use a sound discretion, governing myself by existing circumstances. I have employed these numbers and admeasurements for the purpose of clearly exemplifying the principle under which I proceed, and for no other.

"What I claim, therefore, as my invention, and wish to secure by letters patent, in the within described instruments, consists of the first pelvic belt, with its appendages, as described, and also the mode of applying it; the rupture pad, however, being similar to others now in use, I do not claim. I claim the second pelvic belt, with its application as described. I claim the umbelical belt, and its mode of application, but except from this claim the spiral spring by which the metallic plates are connected. I claim the employment of the night belt, in the manner, and for the purpose, herein designated. I claim the three inguinal pads, or any variation of that number involving the principle upon which they are constructed and applied; and I also claim the ventro-inguinal, scrotal, femoral, and umbelical pads, varying in size and form, according to the indications of their successive application, as set forth. I also claim the successive additions and abstractions of the folds of silk, or other substance, under the pads, regulated by the state of the patient, and the progress of the cure. Intending to include all those modifications of the foregoing apparatus which leave them substantially the same, so that similar effects are produced by analogous means."

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12. For a *Water Wheel;* Alvin and Barton Darling, Bellingham, Norfolk county, Massachusetts, April 3.

This is called "The upright perpendicular pressure wheel, with spiral floats." There is so little substantial difference between this and several of the wheels called reaction wheels, that we think it unnecessary to give any of the particulars of its construction; we could not, in fact, tell what the patentees view as constituting their improvement, as they have omitted altogether to communicate this important information.

13. For *Hair Combs;* George Hooker, Bristol, Hartford county, Connecticut, April 3.

The claims set up by this patentee are to the making of combs out of plates of metal of any kind, so that the back and teeth shall be in one entire piece; and to the beading, or bending, the back, so as to stiffen and keep it in proper shape. Our eyes have deceived, or our memory failed, us, if these claims can be sustained.

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14. For a *Thrashing Machine;* William G. Johnston, Bridgetown, New Jersey, April 3.

This thrashing machine, we are informed, is to be constructed and mounted like other cylinder thrashing machines; but the beaters and spikes, instead of being fixed to the cylinder, are to work upon joints which will admit of their giving way after making the stroke; it is intimated that there are other novelties about the affair, but these being of minor importance, are not claimed, and if they are as old as the major improvement, it was well enough to omit them.

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15. For a *Grist Mill;* Elisha Holton, Westminster, Windham county, Vermont, April 3.

We will not say that we have here another modification of the portable grist mill, but merely another portable grist mill. The patentee, however, has not failed to furnish a list of those parts which he considers as new, but we do not think it necessary to copy his claims.

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16. For an improvement in the *Wheels for Cars and Locomotive Engines, and also in the Boiler Tubes of such Engines;* Matthias W. Baldwin, city of Philadelphia, April 3.

(See specification.)

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17. For an improvement in the *Lathe for turning Lasts, and other irregular forms;* Cullen Whipple, Jonathan Sprague, and Milton D. Whipple, Douglass, Worcester county, Massachusetts, April 3.

A patent was obtained by Thomas Blanchard, in the year 1820, for "a machine for turning and cutting irregular forms," and the patent, which had expired, was renewed by a special act of Congress, on the 30th of June, 1834. The present machine is for the same purpose, and is owned by Messrs. Carter & Hendee, of Boston, to whom it has been assigned, and who are the principal proprietors of Blanchard's machine. Lathes in which were turned figures of almost every form, were in use more than a century ago; there is nothing new, therefore, in the general principle of these machines, but only in the particular arrangement of the parts which are described. Such a machine as that now patented is necessarily complex, and cannot be described without drawings. The variations from Blanchard's machine which have been invented by the above named patentees, we shall not attempt to detail, as there are few persons to whom such

a description would be intelligible, from their being unacquainted with the former machine. It is these specific variations which form the subject of the claim.

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18. For a *Material for Stuffing Beds, Mattresses, &c.;* Joseph C. Smith, Cambridgeport, Middlesex county, Massachusetts, April 3.

The material to be employed is palm leaf, which is to be reduced, by heckling, into filaments, or fibres; these are then to be spun into ropes, and so tightly twisted as to kink the spun material into balls; these are to be put into a steam oven, and so baked as to fix the curl, or twist; when untwisted, it is "a light, elastic, and durable article for stuffing."

A short time since, a patent was obtained for using the fibres made from palm leaf as a stuffing for mattresses, &c., and we then expressed a doubt of the validity of such a patent; if, however, it should be found to be valid, the present patentee has been forestalled by being deprived of the material itself, which he could employ only under a license; but if we were correct in our judgment, the foregoing patent for the mode of rendering the substance used essentially fit for the purpose, would be good. The process is similar to that employed with curled hair.

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19. For *Saw Mill Dogs;* Benjamin F. Snyder, Painted Post, Steuben county, New York, April 3.

There is to be a sliding block crossing the carriage, which rack is moved by an endless screw on a revolving shaft. A toothed wheel, and a ratchet and pall on the end of the shaft, are employed to move the log the proper distance. A dog, with a flat bearing, serves to bear against the log. The parts claimed are, "the entire propelling power of the machine, together with the spiral spring, and the short or flat dog attached to the moving slide under the roller."

The apparatus is very imperfectly described; the *spiral spring*, which is claimed, is not alluded to in the description; and although the drawing furnishes a tolerable idea of the general arrangement, it is altogether deficient in particulars.

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20. For an improvement in *Manufacturing Iron Chests;* Charles J. Gayler, city of New York. First patented April 12th, 1833; patent surrendered, and reissued upon an amended specification, April 3, 1835.

A brief notice of this patent was given in vol. xii., p. 239, and it appears that the specification was found to be defective and invalid in a trial in the District Court of the United States for the Southern District of New York. If, on this trial, the patent was declared void, we very much doubt its being renewable by the present procedure; for although the law authorizes the surrender and renewal, or rather the reissuing, of a patent which has been originally issued under a specification defective from inadvertence, it would seem necessary that

the person surrendering should have something to surrender; but if his patent is repealed, or declared void, in due course of law, the patentee appears then not to be within the pale of the act admitting of amending a specification. This is a point upon which we believe that there is no legal decision on record; our remarks, therefore, are merely the result of our own impressions.

The following is the concluding part of the amended specification.

"The object of my improvement in forming a chest within or over a chest, or a double chest, or safe, is to make an iron chest, or safe, more secure against fire, or thieves.

"I claim as my invention, the construction, or formation, of a double iron chest, or safe, by the union, or combination, of two iron chests, made one within, or over, another, which, on the outside, has the appearance of but one chest, with doors shutting one over, or upon, the other, but is really two chests, combined, and firmly united and secured to each other."

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21. For an improvement in the *Bridge*, usually called Town's bridge, obtained on the 28th of January, 1820; Ithiel Town, city of New York, April 3.

The original bridge is well known as consisting, mainly, of timbers placed diagonally, and crossing each other so as to form a lattice work, into which pins, or trenails, were inserted at each intersection, there being suitable horizontal string pieces at the top and bottom of the trellis work. In the improved bridge, these side trusses are to be doubled, the claim being to "the addition of another similar set, or series, of bracing, of similar kind and dimensions, to be placed in a similar manner, either directly opposite to the former, or in any other manner, so as to bring the second tier not opposite to the former, but so that all the intersections of the braces of the latter series shall fall between those of the former braces on the horizontal string pieces." "One, two, or more, of these trusses, with a floor, and other necessary parts, as usual, will constitute a bridge thus improved."

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22. For a *Screw Press;* Thomas Gilpin, Brandywine Paper Mills, Wilmington, Delaware, April 3.

The screw in this press is to have a shaft, equal in length to itself, upon which no screw is cut; this shaft may be either square, polygonal, or cylindrical; if of the latter form, it is to have a groove its whole length, to receive a feather in the bored hub of a wheel through which it is to slide; if angular, the hole in the hub is fitted to receive it. The opening in the centre of this wheel allows the shaft to slide easily through it, and the wheel may be turned in any convenient way, but an endless screw crossing the frame of the press, and taking into the teeth on the wheel, is preferred. The wheel is confined between cheeks, and when it is turned, the press screw working in a box in the usual way, the follower is moved as desired.

23. For a *Thrashing and Hulling Machine;* Samuel S. Allen, Saratoga Springs, Saratoga county, New York, April 3.

The patentee says, "All that I claim as my invention, is the employment of the semicircular plates, or other contrivance, by which a semicircular groove can be formed, admitting of the increase or diminution of the concave bed, in the manner, and for the purpose, described; adapting the one machine, by this means, to the better thrashing of grain in its different states, and also to the hulling and cleaning of clover, and other seeds."

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24. For a *Horse Power;* Samuel S. Allen, Saratoga Springs, Saratoga county, New York, April 3.

This is one of those horse powers in which the horse walks round in the old-fashioned way. The improvement claimed is in the mode of gearing the wheels, and consists in "passing the second vertical shaft into, or through, a socket within, or below, the main driving wheel, by which the gearing is rendered more simple and compact; and the particular arrangement and combination of the parts by which this is attained."

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25. For an improvement in the *Construction of Fire-places and Chimneys;* Reuben Bacon, and Elijah Harris, Boston, Massachusetts, April 8.

A mantel front is to be cast in one piece, and to this cast-iron jambs are to be fastened by bolts; this front is to be surmounted by a cast-iron mantel shelf, with an aperture in it for the funnel, or flue, for the emission of smoke. A front plate of cast-iron is to be placed on the shelf, and to extend up to the ceiling; this plate is to be perforated with holes, to "allow the heat from the fireplace to escape into the room; this front makes the whole finish of that part of the room."

The funnels and flues are to be of cast-iron, as also may be the toppings of the chimneys.

The drawing is a rude sketch, without references, and the specification is without a claim; most parts of the contrivance have nothing new to recommend them, and those which may be new will not recommend themselves.

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26. For a *Chisel for Mortising Window Sash, &c.;* Charles Rinehart, Marietta, Lancaster county, Pennsylvania, April 8.

This chisel is to be of the form of the mortise to be made; it is to have four cutting sides, and those two which cut across the grain are to be left an eighth of an inch longer than those which cut with it. A hole is to be bored before mortising, and the chisel may be used either with a mallet, or by some forcing machinery. The hole in the chisel is to be about two inches and a half in length; but to allow the chips to escape readily, it is to be cut away on one broad side, so as to leave about three-quarters of an inch only, above the cutting edge.

Such chisels have no claim to novelty, as they have been often

made. They are troublesome to keep in order; but if well made, well kept, and properly used, they answer well for certain special purposes.

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27. For a machine for *Pressing Brick from Dry Clay;* Nathan Sawyer, Mount Vernon, Knox county, Ohio, April 8.

Many machines have been made for the purpose of pressing brick from dry clay, the clay being first pulverized and sifted; the power required to make good brick in this way is immense, and most of the machines have failed from their insufficiency in this particular.

In the machine here patented, the pressure is applied by means of a toggle joint, which, we are of opinion, is the best arrangement for the purpose. One of the machines is at work in this city, (Washington,) and upon weighing the bricks made by it, we have found them, when baked, to weigh upon an average nearly eight ounces more than good stock brick of the same size, and from the same yard, made in the usual way.

The general arrangement of the press we do not think it necessary to describe, but will give some extracts from the specification, concerning points which can be understood without a drawing.

The moulds are made of cast-iron, and lined with steel plates. "The sides of the mould are made concave on the upper edge, the concavity commencing about one inch from the end of its interior, and descending in the middle about an inch; the intention of this will be presently explained." "When the machine is to be used, the clay is prepared by coarsely pulverizing it, and passing it through a screen, the meshes of which measure about one-fourth of an inch, thus reducing the lumps to a proper size, and separating it from pebble stones. The moulds are to be filled by means of a spade, and the superfluous material scraped off by its side. The hollows, or concaves, on the edges of the mould, leave a larger portion of clay at each end than in the middle, without which the bricks would be unsound at their angles, but, by this provision they are rendered perfectly sound. Four bricks are made at every revolution of the crank shaft; and for ordinary brick it may perform six revolutions in a minute, but for the best brick four revolutions are as many as will be proper. The bricks as they are lifted, may be either placed under a shed to dry, or taken at once to the kiln, but they will be better if allowed to dry before they are baked.

"I do not claim, as my invention, the progressive levers, the crank shaft, or the other parts of the machine separately and uncombined; they having, in general, been previously known and used as elements of other machines; but what I do claim as my invention is that general combination and arrangement of the respective parts as herein described, by which this machine is distinguished from all others that have been constructed for the same purpose. I also claim the giving to the mould such a form as shall cause the material with which it is filled to be so much deeper in certain parts, before it is pressed, as will suffice to render the brick, when pressed, as dense and solid at the angles as it is at other parts, whether this be effect-

ed precisely in the manner described, or in any other by which a similar effect is produced by analagous means."

28. For a *Thrashing Machine*; Henry Heberling, Short Creek, Harrison county, Ohio, April 8.

A cylinder and concave are to be set with teeth which do not differ from such as are already in use; the novelty depended upon being in the construction of the concave. Five round iron rods are so arranged as to form the concave, extending along the length of the cylinder; holes are drilled into these rods to receive the teeth, and they work on gudgeons passing into cheeks at each end, so as to admit of the teeth turning down out of the way should hard substances find their way in among them. The gudgeons at one end pass through the cheeks, and have curved levers attached to them, upon which spiral springs operate so as to bring the teeth back to the proper position after the hard substance has passed over them. This is the only part claimed.

29. For a *Horse Power*; John Brandon, Williamsport, Lycoming county, Pennsylvania, April 8.

This, like No. 24, is a horse power in which the animal walks round, and turns a shaft by means of a lever; the things claimed are mere matters of arrangement, and consist in "the plan for adjusting the shafts and gearing in a portable horse power, by wedges, or keys; and the adapting of the bore in which the first shaft runs to the sustaining of the weight of the first driving wheel, as described."

30. For a *Mortising Machine;* Erastus M. Shaw, Brooklyn, King's county, New York, April 8.

This patent is obtained for improvements on the patent obtained on the 21st of October, 1834. The claims made to the improved part consist in "the mode of working the cutters; the mode of working the carriage, and the mode of boring the holes."

31. For an *Auger for boring large holes;* N. J. Lampman, Coxsackie, Greene county, New York, April 8.

This auger is intended for boring the holes for large wooden press screws at one operation, and we see nothing more in it, than its adaptation, from its size, to the purpose intended, the principle upon which it operates presenting nothing new.

32. For a *Galvanic Apparatus, for the cure of diseases;* Daniel Harrington, city of Philadelphia, April 8.

The apparatus here patented is made in various forms, dependent upon the part of the body to which it is to be applied, but in all its forms it consists of two metallic vessels capable of containing warm water, and connected together by a metallic conductor. The claim is to "the construction of hollow instruments, made of different metals, so as to form a galvanic circle, to be applied in the cure of

certain diseases, and which are capable of containing warm water, or other heated material, for the purpose of exalting the electrical or galvanic effect." These vessels, and their connecting strips of metal, are usually covered with thick cloth, which is to be rendered conducting at the opposite ends of the arrangement, by moistening them with salt and water, or in any other convenient way.

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33. For an improvement in the *Power Loom;* William G. Gavitt, South Kingston, Washington county, Rhode Island, April 8.

The improvements here claimed consist, first, in what the patentee calls an acting and re-acting lever, which is intended to operate in such a way as to render the cloth more even than it is when made by the ordinary mode; and, secondly, a particular manner of fixing an index wheel, to show the quantity woven; the exact manner of doing these things would require a drawing, or a more lengthened description than we can afford.

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34. For *Spinning Straw, Hay, &c.,* for winding or packing Scythes, &c.; Philo G. Seldon, Winchester, Litchfield county, Connecticut, April 8.

The claim made is to "the adaptation of a spindle with its appendages, as described, to the purposes, and in the manner set forth. I claim nothing more, the general principle of its action being similar to that in other spinning apparatus."

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35. For a *Saw Mill Carriage;* Henry Gordon, Liberty township, Adams county, Pennsylvania, April 8.

Saw mill carriages; and other sliding frames, are to be made to run upon grooved friction wheels, which are to revolve freely in light frames that receive their gudgeons, and keep them at the proper distance apart. The claim is to the application of friction rollers, formed as described, for the purpose of checking the tendency to lateral motion in saw mill carriages, sliding bridges, and other similar structures, and also the application of friction rollers, either with or without grooves and fillets, to saw mill frames; such rollers not being fixed either into the saw frames, or fender posts, but working up and down between them."

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36. For a *Metallic Shingle;* Charles Southwick and Israel J. Richardson, Palmyra, Wayne county, New York, April 8.

"By this invention we claim every advantage to arise from the use of cast metal shingles of whatever form or construction the same may be, and every advantage to arise from the use of metal shingles of the construction of those above specified, to whatever purpose the same may be applied." It would seem from the foregoing claim that the patentees were not aware that roofs of cast iron of a similar construction have been patented in England. They may be seen described in the "London Journal," [Newton's] vol. 4, 2d series, p. 355; and in other works. The claim made to "every advantage,"

&c., is a claim to the effect, instead of to the means of producing it.

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37. *For a Composition to be burnt in Lamps;* Henry Porter, Bangor, Maine, April 8.

The composition is 1 lb. crude camphor, 1 gal. alcohol, rosin ¼ lb. spirits of turpentine 1 pint, tincture curcuma half an ounce; and thisis to be substituted for the alcohol and turpentine, or the alcohol, turpentine and camphor which have been before patented; the patentee pretends that it is much safer than the former articles, the rosin, however, must be injurious, and the curcuma merely gives the liquid a colour. If the former patents were good, we do not believe that the present could be sustained for merely adding the ingredients named.

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38. For *Generating Steam in Steam Boilers;* Wm. Scarborough, Savannah, Georgia, April 8.

A large portion of the specification of this patent is devoted to the theoretical views of the author, upon an assumption of the truth of which, he founds his improvement; we, however, dissent altogether from his theory, and doubt the advantage of the practice to which it leads. He first assumes, correctly, that the steam generated in a boiler presses upon the surface of the water with a force equal to its pressure on the other parts of the boiler. "It is next assumed that in proportion to the extent of this pressure, the particles, or molecules, of this water are *compacted* together, and that in proportion to the compaction is the difficulty of obtaining admission, or entrance, for the caloric, or heat, to the various particles, or molecules, of this water, which are to furnish the required vapour or steam." Much pains are then taken to prove "that this is no false theory," but throughout the whole, the non-escape of steam is confounded with, or mistaken for, the non-entrance of caloric; the author forgetting that the more dense bodies are generally the best conductors. We cannot enlarge upon this subject, or we should fill our journal; we therefore proceed to the claims:

"What I claim as my own invention for generating steam of high or low pressure, is the principles of transmitting the caloric through the medium of small horizontal, vertical, or diagonal pipes or tubes, at once to the centre, or other part of the fluid, which will have the effect of preventing the compacting or compressing against the more central and cooler parts of the said fluid, in consequence of the greater expansion of that part of it nearest in contact with the caloric.

"Also raising the water from below, and discharging the same through the apex of the cone, or through the pipes or tubes, above or below the level of the water in the boiler. There may be many methods of producing the same effect, but I claim the principle as set forth in my specification, however performed."

The cones named are situated, and to operate, something like the circulators of Mr. Perkins.

39. For the *Construction and Propulsion of Steam or other Boats;* William Scarborough, Savannah, Georgia, April 8.

What is claimed under this patent "in the described method of constructing and propelling steam or other boats, is the peculiar formation of the mode of the boats, or vessels, in combination with the increased celerity of the propelling wheels, to obtain by said combination a more rapid propulsion of the boat, or vessel, through the water; as also the application of the inverted tubes, and friction rollers, or wheels, as set forth. It is to be observed that I claim no originality to any of the parts separately."

It is no easy task to tell for what this patent is taken, as the description is rather discursive, and the individual things mentioned are confessedly not new. It seems necessary that when a patentee depends upon a new combination of known things, this combination should give a peculiar and well marked character to the thing as a whole; otherwise, although the fact may be disclaimed, the individual parts are depended upon to sustain the claim.

We are told that to decrease the resistance to the motion of a boat, the immersion must be reduced as much as possible, so that it may skim over the surface of the water; that the bottom, therefore, should be, as nearly as possible, flat; that the greatest breadth should be considerably abaft the centre, &c.

The shaft of the paddle wheel, it is said, should be placed right over the abaft end of the greatest breadth of the vessel. The size and velocity of the paddle wheel, and also the length of the buckets are discussed; and the conclusion arrived at is that it will be advantageous to increase the velocity of the wheel, and to shorten the buckets in a proportionate degree.

The inverted arches are curved timbers which support the paddle wheel beams, and rest at their lower end against the keelson. The friction rollers are to be run under the wheel shafts.

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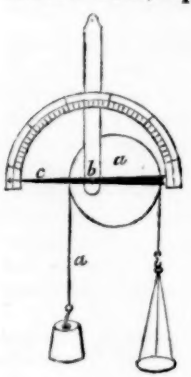
40. For an improvement in the *Balance;* Nereston Griffin, city of New York, April 8.



This contrivance is to operate very much upon the principles of the bent lever balance, as will be seen by the sketch in the margin, where *a* is a grooved wheel working eccentrically upon a pivot at *b*, and carrying an index *c*, the cord *d*, sustaining the weight and the scale; a further description we deem unnecessary. The claim is to "the application of the principle to any of the purposes for which scales or balances are used." When accurate weighing is required, this plan of a beam working on pivots, and subject to other disadvantages, will not supersede the ordinary mode of weighing, to which it is immeasurably inferior.

41. For *Cleaning and Polishing Rice;* M. Scarborough, Savannah, Georgia, April 8.

The claim under this patent "is the application of stone by itself, or with wood, or with any other material with which it, (the stone) can act in combination, together with the due and proper admixture of the chaff, to aid and promote the friction necessary and desirable for the proposed object."

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42. For a *Truss for Hernia;* Benjamin M. Smith, Tahlohnega, Lumpkin county, Georgia, April 14.

The pad plate of this truss is so constructed as to be operated upon by several springs, not admitting of verbal description. The pad itself is to be "a hard substance" which is to enter the hernial cavity, and with the assistance of a surrounding ring, is to produce "such a suppression of the cutaneous circulation as will promote the adhesion of the parts when irritated, and also tend to close the hernial cavity in such manner as greatly to accelerate the cure." The claims made refer to the particular arrangement by which the springs act upon the plates of the pads, and would not, therefore, be understood without the drawing. No particulars are given respecting the form, or variations therein, of the "hard substance" nor any directions relating to treatment as the cure advances.

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43. For a *Cooking Stove;* Thaddeus Fairbanks, St. Johnsbury Plains, Caledonia county, Vermont, April 14.

(See specification.)

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44. For *Tanning Hides;* John Lippincott and John Hillyer, Philadelphia county, Pennsylvania, April 14.

"The part believed to be new and claimed as an invention or improvement, is the plan of tanning *hides*, for the purpose before mentioned, by forming them into bags or sacks to contain the tanning matter, and applying pressure to force the tannin into the body of the hides, as hereinbefore mentioned.

"As it is believed that a process somewhat similar to the above has been adopted by others in tanning the skins of goats and other small animals, the inventors lay no claim to tanning skins on the foregoing plan, but confine their claim to such only as are usually called hides.

We should have supposed, that it was known to tanners that skins intended for morocco leather are generally, we believe uniformly, made into bags, and filled with the tanning liquor, and it is not to be imagined that because tanners technically apply to certain skins the name of hides, that a patent could be sustained on this technical distinction. But apart from this, several patents have been obtained, both here and in England, for tanning *hides*, by making them into bags, or confining their edges between frames, filling them with tanning liquor, and applying pressure either hydrostatically, or by a force pump. We will refer to one only, Peachy's, vol. 14, p. 41.

It has been fully proved that although the process can be thus very much accelerated, so that apparently good leather may be made in a few days, the test of wear has uniformly shown that the article thus made is of a very inferior quality.

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45. For machinery for *Cleaning and Blacking Boots and Shoes;* John Folsom, Hallowell, Kennebec county, Maine, April 14.

Round revolving brushes, such as were formerly much used for polishing, by brass workers, and others, are to be employed in cleaning and blacking boots and shoes. How often they have been so used we do not know, but we have heard them recommended to shoe blacks, forty years ago.

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46. For an improvement in *Tanning;* Isaac M. Belote, Fayette county, Tennessee, April 14.

The skins after being cleaned from the lime, are to be put into a vat, with liquid enough to cover them, which liquid is prepared by adding to water and a bushel of wheat bran added for every five hides, and allowing it to ferment; they are to be handled once a day for four or five days; after this they are to be immersed in ooze from Spanish, or chesnut, oak, in which they are to be handled twice a day for ten days, when they will be of a good colour.

A mixture is then to be made of half a pound of common salt, two ounces of ginger, and two ounces of alum, for a common size hide, and this is to be rubbed in on the flesh side; the hides are then to be bulked down for two or three days to allow them to absorb the materials. These operations are to be succeeded by a good bark for thirty days in the ooze used for colouring; this is to be twice renewed at the end of thirty days, by which time it is said that leather will be produced equal to that usually obtained by twelve months' tanning.

The claim "in the above described mode of tanning is to the application of *ginger*, together with salt and alum for hastening the process of the ooze." What good the ginger may produce, we cannot divine; salt and alum, have both been used in the tanning process.

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47. For an improvement in *Marine Railways;* Washington Van Duzen, Shipwright, Kensington, Philadelphia county, Pennsylvania, April 14.

The drawings would be required to show the particular form and construction of those parts of the marine rail way, upon which the patentee depends for the support of his claim, its general construction being similar to that known as Morton's.

The following is the claim: "The use of iron, or other metal, rollers, ormed as described, to work between the two sets of double rails, having connecting bars to confine the rollers to their stations. I do not claim the connecting bars, nor the use of rollers generally, they having been before known, but limit my claim under this head to the

particular kind of rollers shown in the drawings. The application of the screws in the uprights to the cradle bars. The application of the ratch wheels to act as a cog wheel upon the rack, as a substitute for chains the length of the carriage. The construction and application of the purchase bar, or lever for raising the vessel clear of the carriage, by means of the lifting screws and blocks. The mode of applying and relieving the spring falls which work upwards into the rack, affixed to the under or lower side of the carriage sill, all of which are described in the foregoing specification."

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48. For an improvement in the *Manufacturing of Hair Brushes;* Joseph B. Burgess, city of New York, April 14.

To enable the hair brush to penetrate through hair, however thick and matted, comb teeth are to be inserted in the stock with the bristles. The claim is to "the combination of the comb and the hair brush together, or rather the introduction of the teeth of the comb into the hair brush, thus uniting the efficacy and utility of two old instruments in the improved article now patented."

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49. For a *Family Grist Mill;* Peter M. Wright, city of New York, April 14.

"The claims made in this machine, and herein specified, are, together with its construction, the application of the crank spindle, working rod, and levers; the screwing of the damsel upon the head of the spindle; the manner of regulating and letting the flour into the bolt, and the conical form of the same."

It is not proposed to give great velocity to the runners of this mill, the patentee deeming this unnecessary for family use, and generally injurious to the flour. It is intended to have a crank upon the spindle of the runner, and to extend a pitman from this to a vibrating lever, having handles, by which a man may pull and push alternately. There are a number of figures in the drawing, representing the individual parts of the apparatus, and in the specification a great deal more of disquisition than of description; of the latter, however, there is enough, particularly in the references to the drawings.

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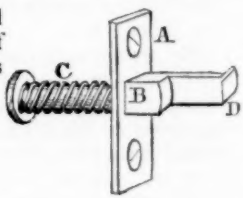
50. For *Machinery for Diminishing Friction;* Benjamin Hinkley, Fayette, Kennebec county, Maine, April 14.

This anti-friction machinery is the same which we have had to notice a great number of times, as, although it is about fifty years old, it still finds its way, every year or two, to the patent office as a novelty. Scarcely a school book, containing the elements of Natural Philosophy, appears without a cut of Garnet's friction rollers, and, in the present instance, we must in charity conclude that the impression made upon the mind of the boy has been retained with no more distinctness than has sufficed to make the man think himself an inventor.

51. For a *Window Spring and Bolt;* Marcus Merriman, Jr., New Haven, Connecticut, April 14.

This bolt does not differ, essentially, either in form or substance, from some other members of this numerous family, which were at one time as prolific as thrashing machines have been of late years. The bolt is to slide back into the window frame through an opening in a small plate screwed on for that purpose. A spiral spring surrounds a shank within the frame, and there is a thumb piece by which to press it in, and relieve it from the notches in the sash. All this occupies half a dozen pages of description, after which the patentee says, "I do not claim as my invention the spiral spring, or its application to window fastenings; both have been long known and used. But I do claim the more perfect and effectual application thereof, particularly in the form of the bolt and plate, and collar, and the simple combination of the several parts by which the spring, and bolt, and collar, above described, is made and inserted as above specified, and by which, new and beneficial results are produced. I also claim the elbow lever, thumb piece, and its application as above specified, and for these improvements, combined and separate, solicit letters patent."

That it may be clearly seen to what all this labour is devoted, we give a sketch of the machinery which is the subject of this patent.



A, is the front plate.
B, head of the bolt.
C, shank and spiral spring.
D, thumb piece.

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52. For a *Horse Power;* Webber Furbish, Hallowell, Kennebec county, Maine, April 14.

The horse is to walk upon an endless inclined plane, constructed like a host of others; but the patentee thinks that there is some novelty in the form of the links which constitute the chain, and claims this, "with the general arrangement and adaptation of the several parts of the machinery to effect the designed purpose." We cannot discover the novelty in the links, and assuredly there is not any in the "general arrangement," &c.

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53. For a *Machine for Dressing Feathers;* Orestes Badger, Otsego, Otsego county, New York, April 22.

(See specification.)

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54. For an *Elliptical Tin Reflector for Cooking;* Joshua Burch, Adams, Jefferson county, New York, April 22.

A tin reflector, "resembling an egg shell cut in two," is to be made two feet two inches long, one foot four high, and eleven inches deep. Within this is to be a sheet iron pan, to contain the articles

to be roasted, and there is to be a door at top for the convenient management of the operation.

"What I claim in the above reflector is its elliptical concave form, by virtue of which an almost infinitely diversified reflection of the rays of caloric is produced by and from the whole of every part of the interior surface."

This will undoubtedly be as good as some other "tin kitchens," but certainly no better; the advantages imagined to result from the elliptical form are theoretical deductions, which will not hold good in practice, from a diffused fire, and an uneven surface.

We have often been on the point of entering our protest against the term *caloric*, when substituted in common usage for the word heat. We have seen thermometrical observations headed "distribution of caloric," a usage of the expression which appears very much like the apeing of knowledge, whilst it manifests its absence. There is more *caloric* in the vapour of water at the freezing point, than there is in water at a boiling heat. Those to whom this is news, should not employ a term, of the value of which they are altogether ignorant.

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55. For an improvement in *Stoves and Grates;* Elkanah Ingalls, Providence, Rhode Island, April 22.

The improvement is designated in the claim, which is to "the application of horizontal sliding doors to stoves and grates of all descriptions," these being substituted for doors which open upon hinges. There are many stoves with sliding doors, some of which may be seen in the Patent Office; but they were known at an earlier date than any of those bear which are to be found there.

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56. For a machine for *Breaking Hemp and Flax;* Ferdinand Stith, Franklin, Williamson county, Tennessee, April 22.

This brake consists of two long horizontal frames, one under the other, the uppermost of which is stationary, whilst the lowermost is made to vibrate backward and forward by means of a pitman, operated upon by a crank. From the stationary, horizontal frame, descends four, or any other convenient number of, vertical frames, having slats at suitable distances crossing them from one side to the other of the machine. The lower, or movable frame, which traverses upon friction rollers, has an equal number of vertical frames rising from it, which are furnished with slats corresponding with, and working into, the spaces between the slats on the stationary frame.

The claim is to "the plan of running a brake in the horizontal manner, and so constructing it as to work one, two, three, four, or more, brakes at the same time, and in the same frame."

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57. For a *Floating Dry Dock;* Jonathan Hawes, Auburn, Cayuga county, New York, April 22.

This dock is described as though such a thing had never before been made, or thought of, there not being any one thing mentioned

as new, or claimed as invented by the patentee. It is to be a floating trunk, with gates at one or both ends to admit and enclose vessels, and pumps to discharge the water. We have described several such, and could refer to more, were it necessary to do so.

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58. For an improved *Rolling Machine;* Isaac Hinman, Hamden, New Haven county, Connecticut, April 22.

This rolling machine is constructed much in the manner of the common flatting mill; the rollers gear together at one end in the usual manner, and extend through the frame at the opposite end for the purpose of planishing, and otherwise operating upon, articles which cannot conveniently be passed through within the frame. It is proposed to forge, or roll, almost every variety of article, by means of dies fitted to the rollers.

"I claim as my improvement, the extension of the rollers to form a planisher on the frame; also the grooves, or gains, and corresponding followers on the rollers and shaft, for welding, shaping, and preparing materials; and also the dies, and the shaft for holding the dies, with all the apparatus thereof, as above described; and the mode, method, and process, of swaging of every kind, by means of dies of any description, operated upon by the power of rollers, as above specified and described."

There are but few things which would require a more limited claim than that of forging by means of rollers, a thing which has been extensively done, and patented under numerous modifications; yet we have, in the foregoing claim, what would seem to comprehend all things, past, present, and to come.

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59. For an improvement in the *Construction of the Joints of Carpenters' Rules;* Lemuel Hedge, Brattleborough, Windham county, Vermont, April 22.

This rule joint does not require the removal of any portion of the thickness of the legs of the rule to which it is applied. Two thin, flat disks of metal, perforated in the centre to receive a joint pin, are riveted one on each side of one of the legs, so that the joint pin shall coincide with the proper angle of the leg. These disks are then covered by two others, of a somewhat larger size, and having excavations into which the first named disks fit; the outer disks are then riveted to the corresponding leg, and a joint pin put through the whole.

"I claim as my invention, the manner of forming the joints of thin plates attached to the sides of the two legs, the intervening space being filled with the substance of the rule itself, instead of the more expensive mode of filling that space with metal."

This kind of joint will answer for the ordinary broad two foot rule, but not for those of a smaller and narrower kind; we, however, should much prefer a good joint made in the old way.

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60. For a *Balance, or Weighing Machine;* John G. Rohr,

assignee of the inventor, John B. Maag, city of New York, April 22.

Mr. Maag formerly obtained a patent for a platform balance, from which that now before us differs in the arrangement and connection of the levers; these particulars would require a drawing for their illustration, one being referred to throughout the specification.

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61. For *Pressing Tobacco, &c.;* Emanuel Shouvler, Richmond, Virginia, April 22.

It is stated that in the ordinary mode of flattening tobacco, and packing it in square boxes for exportation, two presses and sets of hands are employed, one to partially flatten, and the other to prize and finish, which operations the patentee performs by the aid of one press; to accomplish this, he has a square cast-iron box, with a movable bottom, attached, whilst pressing, by keys; this box is about twelve inches square, and five deep; the mode of manipulating is particularly described, but we cannot afford the room necessary to repeat the description. The claim is to the metallic apparatus, and the mode of using it.

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62. For *Kitchen Ranges*, both fixed and movable; Eliphalet Nott, Schenectady, New York, April 22.

There are eleven distinct particular arrangements, or combinations, claimed in this patent, which we cannot epitomize, and which, if given in full, without the drawings, would not be clearly understood.

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63. For improvements in the *Furnace, Boilers, and Chimney, of Steamboats;* Eliphalet Nott, Schenectady, New York, April 22.

"Whereas, inconvenience has arisen on account of the size of the ignited mass, where anthracite coal has been in use, when the pump, or other important machinery, has become deranged; therefore, an improvement has been made in the combination of the parts concerned, which consists,—

"In adjusting two boilers, or two groups of boilers, in such a manner as to leave sufficient space for the furnace between the two; and in closing up the ends, and springing an arch from the one boiler to the other, at the proper elevation, leaving therein a central aperture governed by a valve; and in adjusting the chimney immediately over said aperture; and in providing arch, or crotch, flues from the back of each boiler, or group of boilers, to the central chimney; and in piercing the crust of said flues on the back side, opposite the boilers; and in governing the aperture by valves; so that, by opening the same, and by opening also the valve at the bottom of the central chimney, combustion may, in case of accident, (by changing the direction of the current of air,) be suddenly checked, and the boiler cooled. For further information, reference may be had to the drawings and explanations connected herewith."

as new, or claimed as invented by the patentee. It is to be a floating trunk, with gates at one or both ends to admit and enclose vessels, and pumps to discharge the water. We have described several such, and could refer to more, were it necessary to do so.

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This rolling machine is constructed much in the manner of the common flatting mill; the rollers gear together at one end in the usual manner, and extend through the frame at the opposite end for the purpose of planishing, and otherwise operating upon, articles which cannot conveniently be passed through within the frame. It is proposed to forge, or roll, almost every variety of article, by means of dies fitted to the rollers.

"I claim as my improvement, the extension of the rollers to form a planisher on the frame; also the grooves, or gains, and corresponding followers on the rollers and shaft, for welding, shaping, and preparing materials; and also the dies, and the shaft for holding the dies, with all the apparatus thereof, as above described; and the mode, method, and process, of swaging of every kind, by means of dies of any description, operated upon by the power of rollers, as above specified and described."

There are but few things which would require a more limited claim than that of forging by means of rollers, a thing which has been extensively done, and patented under numerous modifications; yet we have, in the foregoing claim, what would seem to comprehend all things, past, present, and to come.

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"I claim as my invention, the manner of forming the joints of thin plates attached to the sides of the two legs, the intervening space being filled with the substance of the rule itself, instead of the more expensive mode of filling that space with metal."

This kind of joint will answer for the ordinary broad two foot rule, but not for those of a smaller and narrower kind; we, however, should much prefer a good joint made in the old way.

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62. For *Kitchen Ranges*, both fixed and movable; Eliphalet Nott, Schenectady, New York, April 22.

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"Whereas, inconvenience has arisen on account of the size of the ignited mass, where anthracite coal has been in use, when the pump, or other important machinery, has become deranged; therefore, an improvement has been made in the combination of the parts concerned, which consists,—

"In adjusting two boilers, or two groups of boilers, in such a manner as to leave sufficient space for the furnace between the two; and in closing up the ends, and springing an arch from the one boiler to the other, at the proper elevation, leaving therein a central aperture governed by a valve; and in adjusting the chimney immediately over said aperture; and in providing arch, or crotch, flues from the back of each boiler, or group of boilers, to the central chimney; and in piercing the crust of said flues on the back side, opposite the boilers; and in governing the aperture by valves; so that, by opening the same, and by opening also the valve at the bottom of the central chimney, combustion may, in case of accident, (by changing the direction of the current of air,) be suddenly checked, and the boiler cooled. For further information, reference may be had to the drawings and explanations connected herewith."

"I therefore claim as my invention and improvement, the combination of the boilers, furnace, flues, and chimney, so as to pass the air to, and the flame from, the boiler, in the manner and for the purposes aforesaid, or in any other manner preferred; and also the avoiding of the danger arising from a slab furnace by combining tubular boilers, whether the tubes be vertical or horizontal, with a brick furnace, together with the uses to which the same has been, or may be, applied."

Excepting in the claim, we do not find the combination of the tubular boilers in any way alluded to; as this is claimed, it ought to have been described.

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64. For a *Box Cook Stove;* Eliphalet Nott, Schenectady, New York, April 22.

"CLAIM.—I claim as my invention, each and all of the several improvements in said plate, or box, stove, and separate bake-oven; set forth in each and all of the above enumerated combinations, together with the uses," &c. The combinations alluded to amount to nine, to which the remark made under No. 62 will fully apply.

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65. For *Manufacturing Hoes;* Isaac Hinman, Hamden, New Haven county, Connecticut, April 22.

This patent is taken for the particular manner in which the patentee cuts the upper part of the plate from which the hoe is to be made, so as to bend over and weld to form the eye. The claim made is to "the method of forming the eye and the blade of the hoe from the same plate, without welding or riveting them together, and thereby enabling the manufacturer to make them from plates of a size and thickness suited to the kind he is making."

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66. For improvements in the *Printing Press;* John L. Kingsley, city of New York, April 22.

This is the common hand press, working by a toggle joint in a cast iron frame, and not differing in its general construction from those in use. The ends of the toggle joint, and the blocks or dies in which they act, are concave segments of spheres, and receive between them a cast-steel ball, which forms the joints; this, and the manner of making and putting together the frames, constitute the improvements.

"The first of material importance is the frame, the manner in which the casting of the frame, and the wrought iron rods, and the feet, are put together by the screws running through the feet, which is an entirely original plan, that makes the frame stronger, allows it to be lighter, and consequently to take up less room than others. The second part in which there is an improvement is in the works, the whole of which is entirely original. The cupped dies and levers with balls, or the bar and connecting rod, have never been in use before in any machine." "What I claim as my invention and not previously known in the above described machine, is every thing ex-

cepting the bed, platform and ribs; and their manner of connecting with the frame, and the connexions of these particulars."

Broad and sweeping as is the foregoing claim, we really see but very little in this press upon which to found any claim; so far as we can judge from the evidence before us, its peculiarity consists principally in matters of form, but not of substance.

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67. For a *Rotary Pump;* Isaac Hall, Poughkeepsie, Dutchess county, New York, April 22.

This pump is constructed upon the same principle with some others. It consists of an external cylinder, within which an interior cylinder revolves; there being a space between the two which forms the chamber. Two valves, one opposite to the other, shut into the interior cylinder, being inclosed by a stop, or an inclined plane within the chamber. A pin, or rod, passes through the internal cylinder, leading from one valve to the other; and when one is closed by passing the stop, this forces the pin against the opposite valve, and opens it. The improvement claimed is to "the moveable slide passing from one valve to the other, through the centre of the centre wheel, compelling one valve to open as the opposite valve is closed."

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68. For a *Substitute for dressed furs, or fur skins;* Allen Belden, city of Hudson, New York, April 22.

About six years ago several patents were obtained for manufacturing cloth without weaving, the fibres being united upon the principle of felting. In noticing these, we observed that the plan was not then new, having been carried into operation, and subsequently abandoned, both in Europe and in this country. In the specification before us we do not find any thing essentially different from what had been already known. The claim now made is not to any particular machinery, or new manipulation, but simply to "manufacturing a fur cloth or felting, in such a manner, of wool and fur combined, or entirely of fur, and of such size and shape as may be necessary in order to make a valuable and elegant substitute for most of the different kinds of fur skins and peltry now in use."

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69. For a *Machine for cutting Grain and Grass;* Abraham Randall, Verona, Oneida county, New York, April 22.

The difference between this and some other machines for reaping and mowing, is but small; the grain, or grass, passes in between blades projecting forward as it advances, which blades vibrate, and cut like scissors. The claim is to "the cutting of grain or grass with a double acting scissors, that cut both right and left, in the manner set forth; also the raking and discharging as described in the specification."

We are very apprehensive that a moving machine, with a long array of jointed scissors, will be found too complex for advantageous use.

70. For *Friction Boxes for the sheaves of blocks, &c.;* Lewis Aspinwall, city of Albany, New York, April 22.

The claim under this patent is to "the casting said articles in smooth metallic moulds, so as to need no subsequent finish, as my invention, and constituting the improvements herein specified;" *said articles* being the rollers and frame works for the friction bushes sometimes used in blocks. The process of casting in metallic moulds to furnish articles in cast-iron at once extremely hard, and true, is one well understood, and it may very fairly be doubted whether a patent can be sustained for casting a particular kind, or size, of rollers, &c. in a way perfectly well known, and therefore not properly coming under the denomination of an invention, or discovery.

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71. For an improvement in the *Looms for weaving figure work;* John Smith, Shafferstown, Lebanon county, Pennsylvania, April 22.

The improvement is principally in the parts which operate upon the draw boys, and from the pattern. We cannot offer any other description than that which the claim includes, as follows: "I claim as my invention the arrangement of that part of the loom first described, by which the shifters are drawn, instead of being forced back by the action of the pins upon the cylinder. I also claim the mode of connecting the lever which draws the shifters back, by which the cylinder is turned at the proper time and to the proper distance. I claim also the employment of two sets of gears in the same loom, in the manner described, by which it is adapted either to coarse or fine work. It is to be understood that I do not intend to claim the individual parts concerned in either of these operations, but only that general arrangement and connection of those parts by which new and useful effects are produced."

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72. For an improvement in the manner of *Fastening Bedsteads;* Benjamin F. Berry, Utica, Oneida county, New York, April 24.

This is a new, and, we think, a good mode of fastening bedsteads, &c. together. A hook, of cast iron, five-eighths of an inch thick, two inches wide, and six long, is fastened into the post, by a dovetail and wedges, to the dotted line *a;* the hook part projects out, and passes into a notch in the rail, and the eccentric pin is inserted in a hole on the inside of the rail in such a way that the eccentric part acts upon the hook, and tightens the frame. The objection to the fastening is the projecting of the hook from the post to the distance of four inches or more, when the bedstead is down.

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73. For an improvement in the mode of manufacturing *Paris White;* Peter Ferris, Greenwich, Fairfield county, Connecticut, April 24.

The Paris white, or whiting, according to the process of the pa-

tentee, is to be made by dry grinding the material from which it is formed, instead of grinding it as usual, in water; he states that when thus made it is worth from 10 to 25 per cent. more than that ground in water. This may be the case for some purposes, but we know that much of the whiting which is manufactured is not fit for the gilders' use unless it has been well washed, in order to separate from it the silex that is almost always contained in chalk; probably the patentee may use the Agaric mineral, but this he does not mention.

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74. For a *Churn;* Samuel Clark, Parkman, Somerset county, Maine, April 24.

This churn is an oblong box, hung upon gudgeons, and worked by vibrating it. The claim is to "the manner of hanging it, and its operations and ways." If the patentee was the first inventor of this contrivance, he is no stripling.

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75. For *Blocking Hame Collars;* Milvern Eddy, Adams, Jefferson county, New York, April 24.

Four or five patents were obtained a few months since for blocking horse collars, by means of a screw, instead of which the present patentee employs a windlass. The apparatus employed is described at great length, and the following claims are made.

"First. The drawing of the rope round the collars by means of a windlass, or wheel and axle.

"Second. The dividing of the block crosswise into two parts, and making the large end of the block moveable by a screw, or by a windlass, or wheel and axle.

"Third. The wings upon the sides of the block, to keep the collar in proper shape, &c."

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76. For a *Revolving Cheese Shelf;* Henry Weber, East Richfield, Otsego county, New York, April 24.

A series of shelves is placed in a frame, one shelf above the other, and this frame has gudgeons on the centre at each end, allowing the whole to be inverted at once when the cheeses are to be turned. The cheeks of the frame to which are attached the cleats that support the shelves are divided on each side so as to leave a space between them equal to one half of the width of the end, and this space is occupied by the ends of a second frame which is capable of sliding within the other, and of carrying the same number of shelves. A kind of windlass is used to slide this second frame up and down when the cheeses are to be turned. For this purpose the secondary frame is lowered so as to embrace the cheeses between its shelves, and those of the first frame, which is then inverted, slats on one side preventing the slipping out of the cheeses. The shelves may then be separated by means of the windlass. The claim is to the compressing the cheeses between the two sets of shelves in the manner, and for the purpose, above deseribed.

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77. For a *Thrashing Machine;* James Whitehall, Frederick county, Maryland, April 24.

We cannot find room even for the whole claim to this thrashing machine, but will give the commencement as a specimen. "What I claim as my own invention and not previously known in the above described machine is as follows: The cylinder two feet eight inches long, sixteen inches in diameter, with a wrought iron axle two inches square, neatly turned off where it rests on the boxes," &c., &c. &c. through a whole page of novelties of the same character. We are told at length that this "differs from all other machines now in use in not having teeth in the concave, and has but one feeding roller, that may be dispensed with if necessary. And it further differs from other machines in the small number and peculiar formation of the teeth, which gives not only an increase of power, but also thrashes grain without the use of the feeding rollers, if dry."

To know "all other machines in use" is a great extent of knowledge; we have examined a few scores of thrashing machines without having acquired it, although in so doing we have met with many "not having teeth in the concave."

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78. For a *combination of the lever, the crooked shaft or crank, the weights, and the balance wheel, by which to propel machinery;* E. T. Merrill, Parkman, Somerset county, Maine, April 24.

After a description involved in clouds and darkness, if a thing so involved may be called a description, the patentee claims "this combination of the lever, the crooked shaft or crank, the weights, and balance wheel, to propel machinery, and gain a starting point for the same." We greatly err, or the contriver has not his balance wheel in the right place, and we really believe that if he ever propels machinery he must find a new "starting point for the same."

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79. For a *Straw Cutter;* John W. Cope, Franklin county, Tennessee, April 24.

The straw to be cut is put endways into a hopper, in which it is to descend by its own gravity. A sliding frame carrying an oblique knife, with two cutting edges, traverses backwards and forwards under the hopper, being moved by a pitman from a crank shaft, regulated by a fly wheel. There is no claim made, but this had been already done in at least one of the ten straw cutters patented in 1833, several of which resemble that now under consideration; we do not think it necessary to turn to the particular one which is its counterpart.

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80. For a *Bee Hive;* Orlando Marks, Gilrum, Cheshire county, New Hampshire, April 24.

Those who have made themselves acquainted with the different modes of constructing bee-hives will perceive at once, from the nature of the following claim, that there is not any novelty whatever in the thing proposed to be done, nor do the described means of carrying the intention into effect differ in any essential particular from such as have been previously employed.

"What I claim as my invention is the mode of constructing a bee hive, with apartments in such a manner as, by the use of a slide, to shut the bees from different apartments, and thereby take out the honey at any time without killing the bees. Also the construction of an iron hoop attached to the bottom of the hive so as to prevent the bee miller, or moth, from getting into the hive."

The iron hoop alluded to in the latter part of the claim surrounds the hive at its lower end, and constitutes the edge upon which the hive rests upon the bench, or table. As this is considered a very important thing, and, if effectual in its operation, is really so, it ought to have been distinctly explained in the drawing, as the verbal description given is not very clear. We are told that "the lower edge of the hoop must set tight down to the bench, or form, then the bees may go through the space in the hoop, and there is no chance for the bee moth, or miller, to lay his nits under the edge of the hive."

SPECIFICATIONS OF AMERICAN PATENTS.

Specification of a Patent for an improvement in the Mode of Constructing Stoves for Cooking, and for Warming Apartments. Granted to THADDEUS FAIRBANKS, *St. Johnsbury Plains, Caledonia county, Vermont, April* 14, 1835.

To all whom it may concern, be it known, that I, Thaddeus Fairbanks, of St. Johnsbury Plains, in the county of Caledonia, and State of Vermont, have invented certain improvements in the mode of constructing stoves for cooking, and for warming apartments, and that the following is a full and exact description thereof.

The stove upon which my improvements are made, is of the kind known in many places under the name of the "diving stove," and which is so called in consequence of the draft being directed downwards from the fire, before the smoke and heated air make their exit through the ordinary pipe. This stove is best adapted to the burning of wood, and may be made either square or oval, having the general form of the common ten plate stove. The upper part of the stove forms the fireplace; beneath this is the oven, the lower plate of which constitutes the upper part of a flue, formed between it and the bottom plate of the stove. The door for the supply of fuel is best made at one end, the diving, or descending flue, which leads to that below the oven, being at the other. A plate rises at the rear end of the fireplace, forming its back, its upper edge terminating at a sufficient distance below the top plate to allow the flame and smoke to pass over it into the back flue. Openings are made through the top plate to receive cooking utensils.

The rising flue, leading from the lower flue to the stovepipe, I form by making an opening from the said lower flue through the side plate of the stove, near to its front end, which opening is covered by a curved plate, leading from the bottom to the top of the stove, where this rising flue connects with the common stove pipe. I generally

give to the curved plate, forming the rising flue, an inclination towards the back end of the stove, so that it may terminate, and connect with the pipe at about the middle of the side plate. This rising flue, formed by the curved plate, as above described, constitutes one of my improvements.

It is sometimes desirable to allow the draft to escape directly from the fireplace into the flue, without passing down behind and under the oven. To effect this, I make an opening from the fireplace, through the side plate, into the flue, and to this I adapt a valve, or damper, which, when opened, allows of this direct escape, and, when closed, guides the draft underneath the oven. This constitutes my second improvement.

What I claim, therefore, as my invention, is the before described rising flue, formed by the curved plate, combined with the valve, or damper, operating in the way, and for the purposes, described; not intending to claim, in any form or manner, the general construction of the stove with a diving flue, nor any of the individual parts that I have described, with the exception of that which I have above designated as constituting my improvement.

THADDEUS FAIRBANKS.

Specification of a Patent for an improved Machine for Cleaning and Dressing Feathers. Granted to ORESTES BADGER, *Otsego, Otsego county, New York, April* 22, 1835.

To all whom it may concern, be it known, that I, Orestes Badger, of Otsego, in the county of Otsego, and State of New York, have invented an improved machine for cleaning and dressing feathers. And I do hereby declare that the following is a full and exact description thereof.

The machine may, of course, vary in its dimensions, according to the quantity of feathers which are to be acted upon at one operation; the measurements, therefore, which I may indicate, are only to be considered as relative, and belonging to one of ordinary size.

I make a box, or receptacle for the feathers, of sheet iron. This box may be six feet long, two feet six inches wide, and three feet deep; its lower half constitutes a semi-cylinder, placed horizontally, and above this part the sides may rise vertically. A reel, or revolving rake, is placed within this box, so that rows of teeth, or pins, placed upon it, shall come nearly in contact with its cylindrical bottom, and stir up the feathers; one of the gudgeons of the shaft passing through the end of the box, to communicate the requisite motion to it. The cover of the box may consist of cloth, stretched upon a suitable frame. The bottom of it is to be punched with numerous holes, to admit of the passing of heated air into it, and to allow of the escape of the dust separated from the process of dressing. ti nhe feathers

Immediately beneath the before described box, I place stoves, or flues, which may be fed with fuel through suitable openings at each

end of the machine; these stoves, or flues, are so arranged as to distribute the heat as equally as possible under every part of the box; and to intercept its direct, or too powerful action, plates of metal are placed between the upper side of the flues, and the bottom of the box. A depth of about a foot may be allowed for these stoves, or flues.

A frame, or rectangular box of wood, is made to enclose the parts described. The interior of this box I line with sheet iron, or, in preference, with tin plate. The wood, being a bad conductor of heat, will prevent its dissipation, and the absence of brickwork about the fire will leave the apparatus sufficiently light to render it altogether portable, and constantly ready for use.

For the purpose of discharging the feathers, I divide the wooden box into two parts, at or near its middle, horizontally, and hinge these parts together on one side, by which arrangement the feathers, when dressed, can all be emptied out, by turning the upper part over.

When feathers are to be dressed, I put them into the beforenamed receptacle, and pour, or sprinkle, over them a small portion of water, and, when the fire has been lighted in the stove, keep the feathers in constant motion by turning the revolving reel, or rake. As the water evaporates, the feathers will become perfectly lively, and the dust will be separated from them, so as to render them clean; a previous washing being rarely, if ever, found necessary.

What I claim as my invention, is the constructing of a machine for dressing and cleaning feathers, furnished with a box, or receptacle, such as I have described, and in which they are stirred up, or agitated, by the revolution of a reel, or rake, in the manner set forth. I also claim the enclosing of the stoves, or flues, within a wooden box, lined with metal, and the holes for the admission of heated air, and the discharge of dust through the bottom of the receptacle. I also claim the constructing of the wooden box, or frame, in such a manner that the whole of the dressed feathers may be discharged therefrom at once.

ORESTES BADGER.

Specification of a Patent for an Improvement in the Wheels for Locomotive Engines and Cars, for Rail-roads, and in the Tubes for the Boilers of Locomotive Engines. Granted to MATTHIAS W. BALDWIN, *Civil Engineer, city of Philadelphia, April 3d,* 1835.

To all whom it may concern, be it known, that I, Matthias W. Baldwin, machinist, of the city of Philadelphia, in the State of Pennsylvania, have made certain improvements in the wheels, and in the boiler tubes, of locomotive engines, for rail-roads, which improvements, so far as the wheels are concerned, are applicable to rail-road cars, also; and that part which appertains to the tubes of boilers, is applicable to all steam engine boilers in which such tubes are em-

ployed; and I do hereby declare that the following is a true and exact description of my said improvements.

It is well known to engineers upon rail-roads, that in running upon iron tracks, the wrought tire forming the tread of the wheel, when the wheel is altogether of iron, is gradually stretched, and becomes loose; to prevent this, rims of wood have been interposed between the tire, and the rim of a cast-iron wheel; but I have invented an improved mode of interposing wood, which, whilst it is more simple than the plans heretofore adopted, is equally efficacious, and secures certain other advantages not attained by the methods alluded to.

I cast the hub and spokes of the wheel of common soft iron, without a rim; but the spokes have projections on their outer ends, forming sections of a rim, such as would be produced by casting it with a flat rim, and afterwards dividing this by cutting out a piece therefrom, two or three inches wide, midway between each spoke; these projections form suitable bearings within the rim, by which the spokes are to be surrounded. It will be perceived that in making such a casting, the hub may be made solid, and without bands. The rim may be made in various ways; that is, it may be entirely of cast, or entirely of wrought, iron; or it may be in part of cast-iron, with a wrought iron tire; I intend, in general, however, to make the rim of cast-iron, chilled in the usual manner, by which means the strain which always exists when the spokes and rim are cast together, will be prevented; but the main object in view is the interposing between the spokes and the rim, a layer of wood, or other substance possessing a similar degree of elasticity; for this purpose, the spokes are cast of such length as will admit of its introduction, leaving a space between their ends and the interior of the rim, say of one inch, more or less.

To attach the spokes and the rim to each other, I cast the rim with a flanch on one side, projecting inwards, so as to form a bearing for the projecting ends of the spokes, when the two parts are put together; screw bolts are then passed through the ends of each spoke, and though the flanch, by which means they are firmly united to each other.

The pieces of wood between the spokes and the rim may be secured to their places in various ways, as, for example, the projecting ends of the spokes may be made flat, so that the pieces of wood will also be flat on the side which bears upon them, and curved where they bear upon the interior of the rim; this will prevent all tendency to motion endwise, whilst there may be a projecting fillet upon the end of the spoke to check them sideways; there may, also, be a plate cast separately from the spokes, through which the screw bolts may pass, so as to draw them down firmly upon the wood, to confine it in its place. The drawing deposited in the patent office will illustrate these methods; but, without this, a competent workman would find no difficulty on this point. A hub and spokes, cast in this way, may serve for many rims, and these latter may be renewed without the necessity of taking the arms from the axles.

The plan now pursued of putting the tubes, which serve as flues, into the boilers of locomotive engines, is to pass them through the

heads of the boilers, and then to drive ferules, or thimbles, as they are called, into each end of the tube; this, of course, diminishes the size of the tube at each end, causing them to become obstructed more readily by coals, soot, and dust, and rendering it more difficult to clean them out than would be the case, were they of equal size throughout.

To obviate this difficulty, I drive the ferule, or thimble, on to the outside of the projecting ends of the tube, and solder them in their places, by this means rendering the tubes much stronger than they are in the former way, and leaving them of the same diameter throughout.

What I claim as my invention in the apparatus herein described, is the introduction of wood, or other substance similar in elasticity, between the ends of spokes, separated from each other, and the interior of the rim of a wheel, in the manner, and for the purpose, herein set forth; I also claim the securing of the ferules, or thimbles, upon the outsides of the ends of tubes passing through boilers, as above specified and described.

MATTHIAS W. BALDWIN.

ENGLISH PATENTS.

Specification of a Patent granted to RICHARD WALKER, *manufacturer, for an Improvement in Wadding for Fire-arms. Sealed 26th June,* 1834.

This invention consists in the application of metallic disks, (having apertures for the passage of air,) for the purpose of wadding for fowling-pieces, and other fire-arms. Fig. 1 represents a circular disk of metal, which is made to the size required for the bore of the intended fowling piece, and in such a manner as to touch the barrel all round, except at the parts *a*, *a*, which are apertures, or openings, through which the air in the barrel passes, when wadding is rammed down. Fig. 2 is another disk, having holes at *b*, *b*, in place of the apertures, *a*, *a*, which are cut out at the outer edges in fig. 1; and fig. 3 represents another disk, having short slits at *c*, *c*, instead of the apertures in figs. 1 and 2, at *a* and *b*. It will be evident that it is not material what may be the shape or form of the openings, or aper-

tures, care always being taken that they are not made large enough to admit of the escape of the powder. Various advantages may be derived from the application of these metallic disks as wadding, for the purposes of sporting, instead of the wadding commonly used. Amongst other advantages will be the great compactness of the charge, in consequence of the close contact of the powder to the shot. It may also be desirable to observe, that in ramming down the metallic wadding, the interior of the barrel will be materially cleansed after each successive discharge. The patentee here observes, that he usually makes the above described metallic wadding by means of the ordinary fly-press, and that he generally makes the disks from plate or sheet brass, (such brass being tinned,) from one hundred to one hundred and twentieth of an inch in thickness.

The patentee further remarks, that although he prefers brass, he does not intend to confine himself to that metal, because other metals, or compounds of metals, may also be made to answer the same purpose; care being taken that whatever metal is used for that purpose, its hardness shall not be such as to prevent the worm or screw of an ordinary ramrod from easily passing through it, whenever it may be necessary to withdraw the charge; and it is also desirable that, whatever metal may be used for that purpose, it should possess such a degree of elasticity, that, should the disk or wadding be in the smallest degree larger than the bore of the barrel, it may offer such a resistance as to retain itself securely in the place to which it is forced by the ramrod; it may also be desirable to remark, that lead should not be used, owing to its want of that degree of elasticity above described, but more particularly as it would add to that effect (called leading) usually produced by the shot when a fowling-piece is discharged, and which this improved wadding has a great tendency to remove.

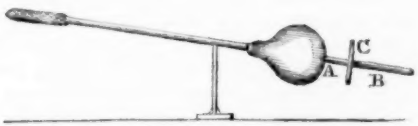
The patentee concludes by saying, that he confines himself to the application of metallic disks, (having suitable apertures for the passage of air,) for wadding for fowling-pieces, and other fire-arms, as above described.

Specification of the Patent granted to JAMES *and* JOHN HARTLEY, *Glass Manufacturers, for a certain Improvement, or certain Improvements, in the Manufacture of Glass. Sealed October* 22, 1834.

To all to whom these presents shall come, &c. &c., Now know ye, that in compliance with the said proviso, we, the said James and John Hartley, do hereby declare the nature of our invention, and the manner in which the same is to be performed and carried into effect, are fully described and ascertained in and by the following description thereof, reference being had to the drawing hereunto annexed, and to the letters and figures marked thereon, (that is to say:)

Our invention relates to part of the process employed in the manufacture of that description of glass called crown glass, used for the

purpose of glazing windows, and other purposes. It is well known that this description of glass is produced from the metal by blowing the same into the form of globes, and afterwards, by means of the operation called "*flashing*," such globes are thrown open into flat circular plates, called tables. Now, our invention relates to that part of the process of manufacture which consists in blowing the metal into globes. According to the ordinary process, the metal, when taken from the pot by the pipe, is rolled on a smooth iron surface, in order to bring the outer end of the metal to a conical form, the extreme end of which becomes the outer axis of the globe during the operation of blowing and working the glass into the required form. This outer axis is called the bullion. During the expanding of the metal into the globular form, the workman rolls the bullion along a straight edge, or bar, called the bullion bar, as is well understood. In doing this, the outer end of the glass globe, whilst expanding, and continually revolving, rubs against the bullion bar, by which action parts of the surface of glass are disturbed, or made irregular, and as the globe extends in dimensions, this rubbed surface enlarges; the consequence is, that when the table of glass is complete, there are at all times more or less waved lines for some inches around the bullion, or the centre of the table of glass, which lessens the value of so much of the table. This prejudicial appearance is produced to the glass, as before stated, by that part of the surface coming in contact with, and rubbing against, the bullion bar, when the metal is in a soft and pliant state. Now, the object of our invention is to dispense with the bullion bar, and to supply its place by the application of a tube, or hollow bearing, for the bullion, or outer axis, of the globe of glass, during the expansion of the same; by this means, that part of the surface which was heretofore rubbed against the bullion bar, is, when worked according to our invention, in no way prejudicially acted on, and the waved appearance before consequent on the manner of operating, is avoided.



Description of the Drawing,

Which represents an ordinary pipe with a globe of glass, the bullion, A, being supported by the tube, B, in which it is caused to revolve by the workman when working the metal into the globular form desired during its expansion. On the tube, B, is placed a shield, C, which is intended to prevent the heat, coming from the heated glass, injuring the hands of the boy who holds the tube. The workman, in performing this part of the process of manufacturing glass, takes a proper quantity of metal on the end of the pipe, and proceeds to form the outer end of such metal into a cone; he proceeds with the process in like manner to that heretofore pursued, till the globe of glass requires

support at the outer end by its axis, or bullion, A; that is to say, he proceeds in the ordinary manner up to the period at which (according to the old means of operating) the bullion would have been rested on, and revolved, and run along the bullion bar; but, in place of so running it along the bullion bar, a boy holds the tube, or hollow bearing, B, in such manner as to receive the bullion, A, and the workman causes the globe to revolve till the globe is sufficiently expanded. The same is then to undergo the operation of flashing, as heretofore.

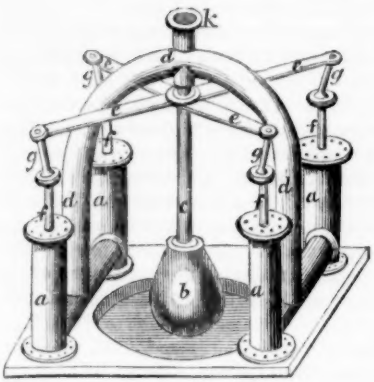
Having thus described the nature of our invention, and the manner of carrying the same into effect, we would have it understood that our invention consists in the application of the tube, or hollow axis, B, in place of running the bullion along the straight edge called the bullion bar, as above described. [*Rep. Pat. Inv.*

Specification of the Patent granted to JOHN BARTON, *Engineer, for his Improvements in the Construction and Application of Pumps, and Machinery for raising Fluids, and other purposes. Sealed June 1st*, 1833.

The object of the patentee is to avail himself of the rolling and pitching motion of a vessel at sea, and to apply that motion as a moving power to actuate pumps on shipboard, in order to raise the bilge water from the hold, instead of employing manual labour for that purpose.

The patentee says that his invention "consists in certain arrangements of apparatus and machinery, whereby he is enabled to take advantage of any vibration which may be produced to the body, or apparatus, or vessel, in which his improvements are placed, and thereby produce to the pump, or pumps, a constant working action. For instance, in a ship, or vessel, whether sailing, or laying at anchor, there will at all times be produced more or less action to the pumps on board, when constructed and applied according to my improvements." He goes on to say, "my invention consists in so suspending or connecting a weight, or weights, to the piston rods of pumps, that in whatever direction an inclination may take place, such weight, or weights, from their being able to act in any direction, will cause a working motion to the pumps; and it is to the giving a universal power to such weight to turn to their work, in whatever direction the inclination or oscillation may take place, which constitutes my patent improvements."

This will be understood by reference to the annexed figure, which represents, in perspective, four pump barrels, *a*, *a*, *a*, *a*, placed at equal distances apart, with a ponderous weight, *b*, attached to a pendant rod, *c*, in the middle, the top of the pendant rod being connected by a ball and socket joint to the standard, *d*, *d*. Near the top of the pendant rod, cross arms, *e*, *e*, *e*, *e*, are affixed; and the piston rods, *f*, *f*, *f*, *f*, of the pumps, are severally connected by small rods, *g*, *g*, *g*, *g*, having universal joints to the ends of the cross arms, *e*, *e*, *e*, *e*.



It will hence be perceived that any motion of the vessel in which this apparatus is placed, will cause the pendant weight, *b*, to oscillate, thereby giving an undulating movement to the cross arms; and these arms raising or depressing the pistons of the pumps, to which they are attached by rods with ball and socket joints, will cause the water to be raised up the suction pipes, shown by dots, and be thence forced along the horizontal pipes, *h*, *h*, and up the standard pipes, *d*, *d*, to the discharging aperture, *k*, at top.

The patentee says, in conclusion, "Having now described the nature of my invention, and the manner of combining and using the same, I would have it understood that I am aware that a weighted pendulum has been already used for actuating pumps, but it has only been capable of swinging or vibrating in one direction, consequently, was of no use in situations where the vibration or oscillation is continually changing its direction. I do not, therefore, lay any claim to a weighted pendulum working in such manner; but I claim the giving a universal property to turn in any required direction to a weighted pendulum actuating pumps, whereby, in whatever direction the vibration or inclination may take place, the said weighted pendulum, or other similar apparatus, may be able to turn in that direction, and work the pump, or pumps. And I would here observe, that although I have only described an arrangement of four pumps, it will be evident that similar effects may be produced to one or more pumps."

[*Lond. Jour.*

Bibliographical Notices.

Elements of Chemistry, including the recent discoveries and doctrines of the Science, by Edward Turner, M. D. &c. &c. &c., Fifth American, from the fifth London edition, with notes and emendations. By Franklin Bache, M. D. &c. &c. (Desilver, Thomas & Co.)

The student of chemistry will hail with pleasure a new edition of this popular work. The author and editor are mutually fortunate; the former to have so excellent an editor, the latter to have so good a work to edit.

It appears to have been the study of Professor Turner to incorporate into his new edition, the discoveries and theories which every day brings to light. In certain parts of the science this has been done by re-writing entire sections, and even chapters. Thus conside-

rable additions have been made to the chapter on light; that on electricity has been almost re-written, as well as that on galvanism. If this were the place to do so, fault might be found with the historical part of the sketch of magnetism and electricity, from which, as Americans, we must dissent. To continue our remarks: judicious alterations have been made in the section on the laws of combination. The use of chemical symbols has been introduced. The departments of organic chemistry revised and much changed. The chemical notation adopted is that of Berzelius, which, if we mistake not, requires all the advantages of extensive use and compactness, to compensate for the difficulty with which the transformations are effected in it. The author has obviously turned to profit the notes and suggestions of the American editor, and indeed acknowledges that he is thus indebted to him.

The American edition has been so carefully revised, that, we doubt not, with the Editor, that "the American edition will be found much more correct than the London work."

The Scientific Class Book, or a familiar introduction to the principles of Physical Science, for the use of schools and academies, on the basis of Mr. J. M. Moffat, with emendations, &c. By Walter R. Johnson, A. M., *Professor of Mechanics and Natural Philosophy, in the Franklin Institute, &c., &c.,* Part I. (Philad., Key & Biddle, 1835.)

This volume of the esteemed work of Mr. Moffat has been improved for use, both by teachers and their pupils, by the questions of the American editor placed at the foot of each page, and the work has thus been adapted to use in schools and academies. As a popular exposition of the various subjects embraced, this work is of considerable interest, and has lost nothing by the adaptation to which we have just alluded, while its accuracy has been increased in the hands of the American editor. The subjects embraced in this first part of the work are Mechanics, Hydrostatics, Hydraulics, Pneumatics, Acoustics, Pyronomics, Optics, Electricity, Galvanism, and Magnetism. The lists of works for reference will be found of value even to the more advanced student in these various branches.

¶ *Manufacture of Wool.*

There can be no doubt that the arts of spinning wool, and manufacturing the yarn into cloth, were introduced into England by the Romans, the inhabitants being previously clothed only in skins. From the period of the Romans quitting England, down to the 10th century, there are no notices of the manufacture; and those relating to the period from the 10th to the 13th century are but few and imperfect. It is certain however, that the manufacture of broad cloths was established soon after the year 1200, if not previously. *(Smith's me-*

moirs of Wool, vol. i. p. 17.) But the woolen manufactures of Flanders being at this period, and long afterwards, in a comparatively advanced state, English wool was exported in large quantities to Bruges and other Flemish cities, whence fine cloths and other products were brought back in exchange. Edward III. took the most judicious measures for improving the English manufacture, by inviting over Flemish weavers, fullers, dyers, and others, and protecting them from the assaults of the rabble. Shortly after the first emigration of the Flemings, or in 1337, an act was passed, prohibiting the wear of any cloths made beyond seas, and interdicting the export of English wool.—(*Ibid.* vol. i. p. 25.) But in these turbulent times such restraining acts were little better than a dead letter; and this, indeed, was soon after repealed. —(*Ibid.* vol. i. pp. 32, 39.) From this remote period the manufacture has always been regarded as of primary importance, and has been the object of the especial solicitude of the legislature. It may be doubted, however, whether it has derived any real advantage from the numberless statutes that have been passed in the view of contributing to its advancement. With the exception, indeed, of the prohibition of the export of English wool, which was finally put a stop to in 1660, the other acts, being mostly intended for the regulation of the manufacture, could not be otherwise than mischevious; and the benefit derived by the manufacturers from the prohibition was more apparent than real; inasmuch as it occasioned a diminished growth of wool, at the same time that it was impossible to prevent its clandestine exportation. Mr. Smith has proved that the manufucture made a far more rapid progress during the reign of Elizabeth, when wool might be freely carried out of the kingdom, than it ever did during any equal period subsequent to the restriction on exportation. Foreign wool began to be imported in small quantities in the 13th century.

At first the manufacture seems to have been pretty equally distributed over the country. In an insurrection that took place in 1525, more than 4,000 weavers and other tradesmen are said to have assembled out of Laneham, Sudbury, and other towns in Suffolk. The manufacture had been previously introduced into Yorkshire. In 1533, an act was passed (34 & 35 Hen. 8. c. 10), reciting "that the city of York afore this time had been upholden principally by making and weaving of coverlets, and the poor thereof daily set on work in spinning, carding, dyeing, weaving, &c.;" that the manufacture, having spread into other parts, was "thereby debased and discredited;" and enacting, as a remedy for this evil, that henceforth "none shall make coverlets in Yorkshire, but inhabitants of the city of York!" This may be taken as a fair specimen of the commercial legislation of the time. Indeed, it was enacted, nearly at the same period, that the manufacture should be restricted, in Worcestershire, to Worcester and four other towns. Worsted goods, so called from Worsted, now an inconsiderable town in Norfolk, where the manufacture was first set on foot, were produced in the reign of Edward II., or perhaps earlier; but Norwich soon after became, and notwithstanding the competition of Bradford, probably is still, the principal seat of

this branch of the manufacture. In an act of Henry VIII. (33 Hen. 8. c. 16.), worsted yarn is described as "the private commodity of the city of Norwich." In 1614, a great improvement took place in the woolen manufacture of the west of England, by the invention of what is called medley or mixed cloth, for which Gloucestershire is still famous. During the reign of Charles II., there were many, though unfounded complaints of the decay of the manufacture: and by way of encouraging it, an act was passed (30 Car. 2. st. i. c. 3), ordering that all persons should be buried in woolen shrouds! This act, the provisions of which were subsequently enforced, preserved its place in the statute book for more than 130 years!

Towards the end of the 17th century, Mr. Gregory King and Dr. Davenant—(*Davenant's Works*, Whitworth's ed. vol. ii. p. 233.)—estimated the value of the wool shorn in England at 2,000,000*l.* a year, and they supposed that the value of the wool (including that imported from abroad) was quadrupled in the manufacture; making the entire value of the woolen articles annually produced in England and Wales, 8,000,000*l.*, of which about 2,000,000*l.* were exported. In 1700 and 1701, the official value of the woolens exported amounted to about 3,000,000*l.* a year. Owing to the vast increase in the wealth and population of the country, the manufacture must have been very greatly extended during the last century; but the increase in the amount of the exports was comparatively inconsiderable. At an average of the 6 years ending with 1789, the annual official value of the exports was 3,544,160*l.* a year, being an increase of only about 540,000*l.* on the amount exported in 1700. The extraordinary increase of the cotton manufacture soon after 1780, and the extent to which cotton articles then began to be substituted for those of wool, though it did not occasion any absolute decline of the manufacture, no doubt contributed powerfully to check its progress. In 1802, the official value of the exports rose to 7,321,012*l.* being the largest amount they ever reached till last year, when they amounted to 7,777,952*l.* During the last 3 years, indeed, every part of the manufacture has been in a state of unexampled improvement and extension. It is probable that the extraordinary rise in the price of wool may give a temporary check to the manufacture; but it cannot be of long continuance. During the five years ending with 1833, the official and the declared or real value of the woolen manufactures exported from the United Kingdom have been as under:—

	1829.	1830.	1831.	1832.	1833.
	£	£	£	£	£
Official value of woolen manufactures exported,	5,372,490	5,558,709	6,097,558	6,544,576	7,777,952
Declared or real val. of do.	4,661,259	4,850,884	5,227,701	5,239,992	6,289,649

Value of the Manufacture. Number of Persons employed.—The most discordant estimates have been given as to both these points. For the most part, however, they have been grossly exaggerated. In a tract published in 1739, entitled *Considerations on the Running* (Smuggling) *of Wool*, the number of persons engaged in the manufacture is stated at 1,500,000, and their wages at 11,737,500*l.* a year.

Dr. Campbell, in his *Political Survey of Great Britain*, published in 1774, observes,—"Many computations have been made upon this important subject, and, amongst others, one about 30 years since, which, at that time was thought to be pretty near the truth. According to the best information that can be obtained, there may be from 10,000,000 to 12,000,000 sheep in England, some think more. The value of their wool may, one year with another, amount to 3,000,000*l.*, the expense of manufacturing this may probably be 9,000,000*l.*, and the total value 12,000,000*l.* We may export annually to the value of 3,000,000*l.*, though one year we exported more than 4,000,000*l.* In reference to the number of persons who are maintained by this manufacture, they are probably upwards of 1,000,000. Sanguine men will judge these computations too low, and few will believe them too high."—(Vol. ii. p. 158.) But the moderation displayed in this estimate was very soon lost sight of. In 1800, the woolen manufacturers objected strenuously to some of the provisions in the treaty of union between Great Britain and Ireland, and were allowed to urge their objections at the bar of the House of Lords, and to produce evidence in their support. Mr. Law (afterwards Lord Ellenborough), the counsel employed by the manufacturers on this occasion, stated, in his address to their Lordships, on information communicated to him by his clients, that 600,000 packs of wool were annually produced in England and Wales, worth, at 11*l.* a pack, 6,600,000*l.*; that the value of the manufactured goods was three times as great, or 19,800,000*l.*; that not less than 1,500,000 persons were immediately engaged in the operative branches of the manufacture; and that the trade collaterally employed about the same number of hands.—(*Account of the Proceedings of the Merchants and Manufacturers*, &c. p. 34.)

It is astonishing that reasonable men, conversant with the manufacture, should have put forth such ludicrously absurd statements. We have already seen that the quantity of wool produced in England and Wales in 1800, did not really amount to 400,000 packs; and the notion that *three* out of the *nine* millions of people then in the country were directly and indirectly employed in the manufacture, is too ridiculous to deserve notice, though it was generally acquiesced in at the time.—(*See Middleton's Survey of Middlesex*, 2d. ed. p. 644; *Adolphus' Political State of the British Empire*, vol. iii. p. 236.)

Mr. Stevenson, who is one of the very few writers on British statistics to whose statements much deference is due, has given the following estimate of the value of the woolen manufactured goods annually produced in England and Wales, and of the interest, &c. of the capital, and the number of persons employed in the manufacture:

Total value of manufactured articles, . .		£18,000,000
Value of raw material, . .	6,000,000	
Interest on capital, sum to replace its wear and tear, and manufacturers' profits,	2,400,000	
Wages of workmen, .	9,600,000	
		£18,000,00

Number of people employed, 480,000, or perhaps 500,000.

But even this estimate requires to be materially modfied. Taking Scotland into account, and allowing for the increase of population and of exportation since Mr. Stevenson's estimate was made, the total value of the various descriptions of woolens annually produced in Great Britain may, at present, be moderately estimated at from 20,000,000*l.* to 22,000,000*l.* or 21,000,000*l.* at a medium. We have further been assured by the highest practical authorities, that Mr. Stevenson's distribution of the items is essentially erroneous; and that, assuming the value of the manufacture to be 21,000,000*l.* it is made up nearly as follows:

Total value of manufactured articles,	.	£21,000,000
Value of raw material, . .	7,000,000	
Oil, soap, dye stuffs, &c. .	1,450,000	
Wear and tear of capital and profit,	4,250,000	
Wages, . .	8,300,000	
		£21,000,000

At present, the average wages of the people employed may be taken at about 25*l.* a year, making the total number employed 332,000. And, however small this may look as compared with former estimates, we believe it is fully up to the mark, if not rather beyond it.

M'Culloch's Dict.

¶ *Distillation of Salt Water.*

The subject of the distillation and purification of salt water having been frequently discussed in the Mechanics' Magazine, a correspondent has favoured us with a copy of a report made by Mr. Secretary (afterwards President) Jefferson to the American Congress, "on a claim for a reward for a discovery, alleged to have been made on that subject." It contains some very interesting historical and scientific particulars respecting it, which, we believe, are not generally known; and shows, that at the date of the report, as much was known upon the subject as at the present day, and that, save a knowledge gained from experience—in one instance, rather costly—of a few plans that will not answer, we are no nearer the attainment of the desired object than we were half a century ago.

Experiments by T. Jefferson, Esq., Secretary to the United States of America, on the Distillation of Salt Water; being a Report by him to the American Congress, on a claim for a reward for a discovery alleged to have been made on that subject.

The petitioner sets forth, that, by various experiments, with considerable labour and expense, he has discovered a method of converting salt water into fresh, in the proportion of eight pints out of ten, by a process so simple, that it may be performed on board of vessels at sea by the common iron cabouse, with small alterations, by the same fire, and in the same time, which is used for cooking the ship's provisions; and offers to convey to the government of the United States, a faithful account of his art, or secret, to be used by or within

the United States, on their giving to him a reward suitable to the importance of the discovery, and, in the opinion of government, adequate to his expenses, and the time he has devoted to the bringing it into effect.

In order to ascertain the merit of the petitioner's discovery, it becomes necessary to examine the advances already made in the art of converting salt water into fresh.

Lord Bacon, to whom the world is indebted for the first germs of so many branches of science, had observed, that, with a heat sufficient for distillation, salt will not rise in vapour, and that salt water distilled is fresh. And it would seem that all mankind might have observed, that the earth is supplied with fresh water chiefly by exhalation from the sea, which is, in fact, an insensible distillation effected by the heat of the sun. Yet this, though the most obvious, was not the first idea in the essays for converting salt water into fresh. Filtration was tried in vain, and congelations could be resorted to only in the coldest regions and seasons. In all the earlier trials by distillation, some mixture was thought necessary to aid the operation by a partial precipitation of the salt, and other foreign matters contained in sea water. Of this kind were the methods of Sir Richard Hawkins, in the 16th century; of Glauber, Hauton, and Lister, in the 17th; and of Hales, Appleby, Butler, Chapman, Hoffman, and Dove, in the 18th; nor was there any thing in these methods worth noting on the present occasion, except the very simple still contrived extempore by Captain Chapman, and made from such materials as are to be found on board every ship, great or small. This was a common pot with a wooden lid of the usual form, in the centre of which a great hole was bored to receive, perpendicularly, a short wooden tube, made with an inch and a half auger; which perpendicular tube received at its top, and at an acute angle, another tube of wood also, which descended till it joined a third, of pewter, made by rolling up a dish, and passing it obliquely through a cask of cold water. With this simple machine he obtained two quarts of fresh water an hour, and observed, that the expense of fuel would be very trifling, if the still was contrived to stand in the fire along with the ship's boiler.

In 1792, Dr. Lind proposing to make experiments of several different mixtures, first distilled rain water, which he supposed would be the purest, and then sea water, without any mixture, which he expected would be the least pure, in order to arrange between these two supposed extremes, the degree of merit of the several ingredients he meant to try. "To his great surprise," as he confesses, "the sea water distilled without any mixture was as pure as the rain water." He pursued the discovery, and established the fact, that a pure and potable fresh water may be obtained from salt water by simple distillation, without the aid of any mixture for fining or precipitating its foreign contents. In 1767, he proposed an extempore still, which, in fact, was Chapman's, only substituting a gun barrel instead of Chapman's pewter tube, and the hand-pump of the ship to be cut in two, obliquely, and joined again at an acute angle, instead of Chapman's wooden tubes bored express; or instead of the wooden lid and upright

tube, he proposed a tea kettle, (without its lid or handle,) to be turned bottom upwards, over the mouth of the pot, by way of still head, and a wooden tube leading from the spout to a gun-barrel passing through a cask of water, the whole luted with equal parts of chalk and meal moistened with salt water.

With this apparatus, of a pot, tea kettle, and gun barrel, the Dolphin, a twenty gun ship, in her voyage round the world in 1768, from fifty-six gallons of sea water, and with nine pounds of wood, and sixty nine pounds of pit coal, made forty-two gallons of good fresh water at the rate of eight gallons an hour. The Dorsetshire, in her passage from Gibralter to Mahon, in 1769, made nineteen quarts of pure water in four hours with ten pounds of wood. And the Slambal, in 1773, between Bombay and Bengal, with a hand-pump, gun-barrel, and a pot, from six gallons of sea water made ten quarts of fresh water in three hours.

In 1771, Dr. Irvine, putting together Lind's idea of distilling without a mixture, Chapman's still, and Dr. Franklin's method of cooling by evaporation, obtained a premium of £5,000 from the British Parliament. He wet his tube constantly with a mop instead of passing it through a cask of water: he enlarged its bore also, in order to give a freer passage to the vapour, and thereby increase its quantity by lessening the resistance or pressure on the evaporating surface; this last improvement was his own, and it doubtless contributed to the success of his models; and we may suppose the enlargement of the tube to be useful to that point at which the central parts of the vapour, passing through it, would begin to escape condensation. Lord Mulgrave used his method in his voyage towards the North Pole, 1773, making from thirty-four to forty gallons of fresh water a day, without any great addition of fuel, as he says.

M. de Bougainville in his voyage round the world, used very successfully a still which had been contrived in 1763, by Poyssonier, so as to guard against the water being thrown over from the boiler into the pipe, by the agitation of the ship. In this, one singularity was, that the furnace or fire-box, was in the middle of the boiler, so that the water surrounded it in contact. This still, however, was expensive, and occupied much room.

Such were the advances already made in the art of obtaining fresh from salt water, when Mr. Isaacks, the petitioner, suggested his discovery.

As the merit of this could be ascertained by experiment only, the Secretary of State asked the favour of Mr. Rittenhouse, President of the American Philosophical Society, of Dr. Wistar, Professor of Chemistry in the College of Philadelphia, and Dr. Hutchinson, Professor of Chemistry in the University of Pennsylvania, to be present at the experiments. Mr. Isaacks fixed the pot of a small iron cabouse, with a tin cap, and straight tube of tin passing obliquely through a cask of cold water; he made use of a mixture, the composition of which he did not explain, and from twenty-four pints of sea water, taken up about three miles out of the Capes of Delaware at

flood tide, he distilled twenty-two pints of fresh water in four hours, with twenty pounds of seasoned pine, which was a little wetted by having lain in the rain.

In a second experiment on the 21st of March, performed in a furnace and five gallon still at the college, from thirty-two pints of sea water he drew thirty-one pints of fresh water in seven hours, twenty-four minutes, with fifty-one pounds of hickory, which had been cut about six months. In order to decide whether Mr. Isaacks' mixture contributed in any and in what degree to the success of the operation, it was thought proper to repeat his experiment under the same circumstances exactly, except the omission of the mixture. Accordingly, on the next day, the same quantity of sea water was put into the same still, the same furnace was used, and fuel from the same parcel. It yielded, as his had done, thirty-one pints of fresh water in eleven minutes more of time, and with ten pounds less of wood.

On the 24th of March, Mr. Isaacks performed a third experiment. For this, a common iron pot of 3½ gallons was fixed in brick work, and the flue from the hearth wound once round the pot spirally, and then passed off up a chimney. The cap was of tin, and a straight tin tube of about two inches diameter, passing obliquely through a barrel of water, served instead of a worm. From sixteen pints of sea water he drew off fifteen pints of fresh water, in two hours fifty-five minutes, with three pounds of dry hickory and eight pounds of seasoned pine. This experiment was also repeated the next day, with the same apparatus and fuel, from the same parcel, but without the mixture. Sixteen pints of sea water yielded, in like manner, fifteen pints of fresh, in one minute more time, and with a half pound less of wood. On the whole, it was evident that Mr. Isaack's mixture produced no advantage either in the process or result of the distillation.

The distilled water, in all these instances, was found on experiment to be as pure as the best pump water of the city. Its taste, indeed, was not as agreeable, but it was not such as to produce any disgust. In fact, we drink, in common life, in many places, and under many circumstances, and almost always at sea, a worse tasted, and, probably, a less wholesome water.

The obtaining fresh from salt water, for ages, was considered as an important desideratum for the use of navigation. The process for doing this by simple distillation is so efficacious, the erecting an extempore still with such utensils as are found on board of every ship, is so practicable, as to authorise the assertion, that this desideratum is satisfied to a very useful degree. But though this has been done for upwards of 30 years, though its reality has been established by the actual experience of several vessels which have had recourse to it, yet neither the fact nor the process is known to the mass of seamen, to whom it would be most useful, and for whom it was principally wanted. The Secretary of State is therefore of opinion, that since the subject has now been brought under observation, it should be made the occasion of disseminating its knowledge generally and effectually among the seafaring citizens of the United States. The following is one of the many methods which might be proposed for doing this. Let the clearance for

every vessel sailing from the ports of the United States be printed on a paper, on the back whereof shall be a printed account of the essays which have been made for obtaining fresh from salt water, mentioning shortly those which have been unsuccessful; and more fully those which have succeeded; describing the methods which have been found to answer for constructing extempore stills of such implements as are generally on board of every vessel, with a recommendation in all cases, where they shall have occasion to resort to this expedient for obtaining water, to publish the result of their trial in some gazette on their return to the United States; or to communicate it for publication to the office of the Secretary of State, in order that others may, by their success, be encouraged to make similar trials, and be benefitted by any improvement or new ideas which may occur to them in practice.

TH. JEFFERSON.

Lond. Mech. Mag.

¶ *Oil Trade of Naples.*

The oils of the kingdom of Naples are produced in Apulia, from Bari to its southern extremity, the Capo di Leuca, a district comprising the territories which export from Gallipoli and Taranto; and in Calabria, from Rossano, on the gulf of Taranto, across to Gioja. The whole coast, from Gioja as far as Gaeta, is covered with olive trees. They are also abundant in the Abruzzi, and the Terra di Lavoro; but Apulia and Calabria furnish by far the greatest quantity of oil.

The principal magazines, or *caricatori*, for oil, are at Gallipoli and Gioja.

Gallipoli supplies England, Holland, the north of Europe, and, in short, all those countries that require the most perfectly purified oil. It is clarified to the highest degree, by merely keeping it in cisterns hollowed out of the rock on which the town is built. The voyages it has to perform being long, it is put into casks so well constructed, that it frequently arrives at Petersburgh, in the heat of summer, without the least waste, or leakage,—an advantage attributed to the seasoning of the staves, which, before they are put together, are well soaked in sea water.

We borrow the following details, with respect to the preparation of oil at Gallipoli, from a very interesting paper, communicated by an English gentleman who had resided in the town, in the volume entitled, *Vegetable Substances Materials of Manufactures*, published by the Society for the Diffusion of Useful Knowledge.

"The rock on which the town is built, is easily excavated, and in caverns thus constructed, oil clarifies sooner, and keeps without rancidity much longer, than in any other place. Hence, numerous oil-houses are established at Gallipoli, and a very considerable portion of the rock is cut into cisterns. A Gallipolitan oil warehouse generally occupies the ground floor of a dwelling house, and has a low arched roof. Some are more extensive, but on an average they are

about thirty feet square. In the stone floor you see four, six, or more holes, which are circular, about two feet in diameter, and like the mouths of wells. Each of these holes gives access to a separate cistern beneath your feet, and when the oil is poured into them, care is taken not to mix different qualities, or oils at different stages, in the same reservoir. One cistern is set apart for *oglio mosto*, or oil that is not clarified; another for pure oil of the season; another for old oil, &c. I have seen oil that had thus been preserved for seven years in a perfect state, or, as the Gallipoli merchants have it, *chiaro, giallo, e lampante*,—words which, during some months, I have heard at least one hundred times a day. I also many times verified the fact; the *mosto*, or oil in its turbid state, which arrived almost as black and thick as pitch, soon became bright and yellow in these excellent reservoirs, without any help from man.

"All the oil, whatever may be its quality, is brought to the magazine in sheep, or goat skins, which are generally carried on mules, there being but few *strade rotabile*, or roads fit for wheeled carriages, in these ports. In a good year, and at the proper season, I have counted, in the course of an afternoon's ride, as many as one hundred mules returning from Gallipoli, where they had been to deposit their unctuous burdens, to different towns and villages in the Terra d'Otranto, or the more distant province of Bari. The quantity of oil required may be conceived, when I state, that at one time, (in the year 1816,) I saw nine English, three American, two French, and six Genoese vessels, (not to mention some small craft from the Adriatic,) all waiting in the port of Gallipoli for entire or partial cargoes of it. When the oil is to be shipped, it is drawn off the cistern into *uteri*, or skins, and so carried on men's shoulders down to a small house on the sea shore. In that house there is a large open basin, capable of containing a given quantity, and of measuring the oil, and into that the porters empty their skins as they arrive. A tube communicates from the basin to a large cock at the outside of the house. When the basin is full, well made casks, of various sizes, for the convenience of stowage, are placed under the cock, which is then turned, and the casks are filled. As the casks are closed up by the cooper, the porters roll them down to the brink of the sea, where the sailors secure several of them together with a rope, and taking the end of the cord into the boat, they row off to the vessel, towing the oil casks through the water after them.

"I first became acquainted with the Gallipolitans shortly after the fall of Napoleon, whose system, whatever good parts of it may have done in the rest of Italy, was certainly most ruinous to the provinces of Leuca and Bari. Unable to export, or find any market for their produce, the proprietors in many parts of those provinces let the olives lie and rot upon the ground. For some years, indeed, the price of oil scarcely paid the cost of its preparation, to say nothing of transport, and other necessary expenses. During the continental system, the best *chiaro, giallo, e lampante* oil was sold at Gallipoli for eight Neapolitan ducats the salma; in 1816 and 1817, it found a ready market at from sixty to seventy ducats per salma!

"Those who, during the evil time, had penetration enough to foresee better days, and that a system opposed to the general commercial prosperity of Europe could not last, and who had, at the same time, money enough for such objects, by annually making their oil as usual, and buying up the oil of others at the low current prices of the day, realized enormous profits when peace threw open the port of Gallipoli, and ships of all nations flocked thither as before.

"The olives of which the Gallipoli oil is made, are never gathered, but allowed to drop in their maturity from the trees on the ground, where they are picked up, chiefly by women and children, and carried to the mill.

"The machinery employed in expressing the oil is of the rudest kind, and, no doubt, numerous improvements might be introduced, not only into this branch, but into that of cultivating the olive tree. The peasantry, however, and, in the kingdom of Naples, those who stand higher in the scale of fortune and rank, are too often but boors in intellect, are obstinate in their attachment to old practices, and are apt, when any of these are reprehended, to stop discussion by saying,—*Faccio come faceva la buon' anima di mio padre, e cio basta*, (I do as my father of blessed memory did before me, and that 's enough.)

"The poor people of the country make culinary uses of the same oil that is exported, and which, in England, is only used in manufactures, or burnt in lamps; but in the houses of the gentry I have often tasted oil prepared with more care, which was truly delicious, being equal to that of Sorrento, Vico, and Massa, or even to the best oils of Tuscany, or Provence."

The *caricatori* of Bari and Monopoli furnish oils for the consumption of Upper Italy and Germany, through the medium of Venice and Trieste. They also draw supplies from Brindisi and Otranto.

The *caricatori* of Taranto, of Eastern Calabria, or Retromarina, and of Western Calabria, the principal of which is Gioja, furnish supplies for Marseilles, &c. But the *caricatori* now mentioned, having no conveniences for clarification, produce only the thick oils used for soap making.

The oils of Sicily, like those of Tunis, are too thin to be used singly in the making of soap, and being used only for mixing, are less valuable than most others.

The oil trade in the provinces is in the hands of respectable houses, which purchase by retail of the several planters. The oil thus collected is sold in Naples at a profit equal to the difference between the size of the measures by which it is bought, and those by which it is sold. To facilitate transactions, orders, or *cedules*, are circulated, representing quantities of oil deposited in the provincial *caricatori*. These orders are negociable, like bills of exchange, and are endorsed by the intermediate holder, who receives their value in cash, without, however, becoming liable for their due satisfaction. The only responsible parties are the drawer and drawee. The latter is obliged to deliver the oil at sight of the order, or to hold it, at the bearer's disposal, till the 10th of November, for the *caricatori* of Apulia, and

till the 31st of December for those of Calabria. If the contract be for time, that is, from one year to another, the oil is usually placed at the purchaser's command on the 1st of March. Purchases for time are effected by means of a contract, wherein the vendor undertakes to deliver the oil by the end of January, on receiving payment of the money; but the oil, as observed above, is not really at the purchaser's disposal before the beginning of March. Hence, in time bargains, the payment of the money precedes the delivery of the oil more than a month; scarce an instance is on record of an engagement of this sort having been broken, and the order is as readily negociable as any other security.

In purchases of oil at command, payment likewise precedes the delivery of the article; but in this case, the advance is confined to the five days necessary to transmit the order to the *caricatore* where the oil is kept for delivery.

The oil remains in the *caricatore*, under the care and responsibility of the vendor, to be delivered, on demand, to the bearer of the order, free of all costs and charges whatever for the first year; but for every successive year, from twenty-five to thirty grains per salma are charged for keeping, and for renewal of warranty.

[*M'Culloch's Dict.*

Notice of an easy Method of filling long Syphon Tubes, in a Note addressed (by request) to the Editor. *By* William Foster, Esq.

New Haven, Nov. 26, 1834.

Sir,—Agreeably to your request, at the conclusion of your very interesting lecture, I will now put on paper a brief statement of the application of the syphon upon a large scale, for the purpose of drawing water from distant places. This application may not be new; but I do not remember to have seen it in this, or any other country, before I tried the experiment. The ancients, we know, brought water for the supply of their cities, by means of costly aqueducts, over hills and vallies, without ever using the fountain principle.

About twenty years ago, I suggested to some gentlemen in Boston the feasibility of conducting water from one good well to dry reservoirs in the neighbourhood, in consequence of hearing that certain wells in the city had copious springs of good water, which became bad for want of sufficient use. The idea of carrying water through a syphon several hundred feet in length, and drawing water from one well into another, was discussed by these gentlemen, and treated with ridicule. But some years after, Mr. Chapman, proprietor of a distillery in Charlestown, requested me to describe the process; and with that instruction, he employed a plumber to lay a leaden tube of three quarter inch bore, from a well twenty-five feet deep, several hundred feet distant from the well of his distillery, which was about thirty feet deep, and where he wanted a greater supply of water.

The operation failed. He then came to me, and told me that I had led him into an expensive error. I told him that, had he com-

municated to me his intentions, I would, with great pleasure, have superintended the work; but now, not knowing what defects there might be in the tube, I could not answer for his success. However, I consented to assist him, but my first essay was unsuccessful.

I need not inform you, sir, as to the principles of the syphon, or that its power to overcome an eminence is limited to about thirty-two feet, answering to the column of water which the pressure of the atmosphere can raise; or that any defect in the syphon, or any air confined in it, would be fatal to its operation. The usual mode of charging a syphon, you know, is by exhausting it partially by inspiration at the longer end. But this was not possible with a tube several hundred feet long, and the expense of a pneumatic apparatus, to procure a vacuum, would have been too great; therefore, I had determined to put it in operation by filling it with water, both ends being stopped; this was done by a small branch at the summit of the tube; and, when filled, this branch was well corked, and the cork pressed down hard on the water, so as to exclude all the air at the surface. It was to be apprehended that some undulations might exist in the horizontal part of the tube, and afford a receptacle for air, which would there be confined without a possibility of escaping, and also prove fatal to the success of the experiment; but of this I could know nothing, as I had not seen the tube laid.

In this state of uncertainty, I began the operation, and filled the syphon; but, as I said before, it failed. On the second trial, I observed that, when the syphon was full, the water in the filling branch rose and fell alternately, and so much, that as water has but little elasticity, I concluded that there was air in the tube, and it was, therefore, emptied. Then, to charge it anew, and, at the same time, to exclude the air, it was proposed to perforate the lower end of the long branch, at the bottom of the receiving well, with a fork, just above the cork which closed it. These small holes allowed the air to escape as it was driven before the water, without losing enough water to prevent the filling the tube with ease. Thus was the air excluded, and the syphon put into operation, and continued for a long time, with some occasional obstruction, arising from the smallness of the tube, and the want of water at the source.

I should suppose that there were many situations where water might be brought from one valley to another, over any hill not exceeding thirty-two feet, or which could, without too much expense, be reduced to that point, for the purposes of irrigation, or manufacturing. Large quantities of water, as well as small, may be raised by means of iron mains, of large dimensions; and the cutting down hills to procure levels, or surrounding them, and thus increasing the length of aqueducts, at a great expense, and loss of water by percolation and evaporation, may be avoided. Mountain swamps may be drained, or any swamps, where a lower level is not too far distant for the place of issue, or even in a level country, provided some vein of loose gravel can be found, into which a place of discharge may be dug below the surface of the swamp. The ingenuity of our country-

men, will, I am confident, yet find many other useful purposes to which the principle may be applied.

P. S. Have you any knowledge of the process whereby the Chinese convert rice into a substance resembling pearl? If it were not expensive, many useful articles might be made of it.

[*Silliman's Am. Jour.*

¶ *Experiments to ascertain the Existence of Lead in the Atmosphere of a White Lead Manufactory. By* Mr. Arthur Dunn.

Having witnessed at my manufactory, the frightful effects of white lead on the workmen employed, I was anxious to determine if it was possible for lead to exist in the atmosphere, and, through that medium, be absorbed into the system by the action of the lungs. For this purpose I made the following experiment, which certainly is important to the manufacturer, as it points out a serious evil to be guarded against. I shall now merely confine myself to the results obtained, and leave to some of your more scientific friends, any theoretical reasoning, or practical hints, the experiment may suggest, provided you consider it worthy to occupy a space in your valuable magazine, and remain, Yours, &c.

Arthur Dunn.

An evaporating dish, containing about twenty-eight pounds of moist carbonate of lead, was placed in a sand bath, and heated to about the same temperature as the drying stove commonly used, never exceeding 150° Fahr.; over this was fixed, at the distance of from eight to twelve inches, a pair of common bellows, with a glass tube attached to the pipe, which pipe was introduced into a green glass bottle containing twelve ounces of distilled water, acidulated with two drachms of nitric acid. The apparatus being thus arranged, the bellows were set in action, by which means the atmosphere, loaded with the moisture from the lead, was made to pass in a continued current through the liquid; this was continued for six hours. The whole was then transferred into a platina dish, and evaporated to perfect dryness. The residue was dissolved in one ounce of distilled water, with two drops of nitric acid, to insure the solution of the lead, should any be present. A current of sulphuretted hydrogen was next passed through the solution, which immediately gave a minute dark precipitate; this being collected on a filter, and washed, was transferred to a watch-glass, and treated in the usual manner with nitric acid to decompose the sulphuret, which gave, on the application of hydriodate of potash, the most unequivocal proof of the presence of lead.

Another experiment was conducted at the same time, with similar vessels, in the same room, but the current of air was not passed through the liquid. This, on the application of sulphuretted hydrogen, gave not the least indication of lead, but, on evaporating the whole to dryness, and treating the residue, in the manner

before described, with hydriodate of potash, the slightest possible trace of the yellow iodine of lead was perceptible. The nitric acid and distilled water were separately tested with great care, but were found perfectly free from lead, so that, no doubt, the trace of lead must have been absorbed from the atmosphere, as the bottle containing it stood beside the one through which the current of air was passed. I ought to have mentioned before, that the temperature of the laboratory during the experiment was from 70° to 80° Fahr., and that the door was kept closely shut, that the air might be loaded as much as possible with the vapour.

[*Lon. and Ed. Phil. Mag.*

¶ *Self-acting Mules.*

"Mules have been constructed which do not require the manual aid of the spinner, the mechanism being so contrived as to roll the spindle carriage out and in at the proper speed, without a hand touching it; and the only manual labour employed in these machines, which are called self-acting mules, is that of the children who join the broken threads. The first machine of this kind was invented by the ingenious Mr. Strutt, F. R. S., of Derby, the son of Mr. Jedediah Strutt, the partner of Arkwright; and the following mention is made of it in a memoir of that gentleman, written by his son, Mr. Edward Strutt, at present member for Derby. Mr. Strutt died on the 29th of December, 1830, and the memoir appeared shortly after in a periodical journal: 'Among his other inventions and improvements, we may mention a self-acting mule for the spinning of cotton, invented more than forty years ago, [therefore before 1790;] but we believe the inferior workmanship of that day prevented the success of an invention, which all the skill and improvement in the construction of machinery of the present day has barely accomplished.'"

But the self-acting mule which has met with most success, is that invented by Mr. Roberts, of the firm of Messrs. Sharp, Roberts, & Co., of Manchester. For all the finer qualities of yarn, it is the only machine now employed.

"By this machine, for which the first patent was taken out in 1825, and the second, for a further improvement, in 1830, a very close approach to perfection seems to be made. It produces a considerably greater quantity of yarn, of more uniform twist, and less liable to break, and it winds on the cop more evenly and closely, so that the yarn is more desirable for the weaver. Roberts' self-acting mule is coming rapidly into use throughout the spinning district. In March, 1834, the patentees informed me that they had made 520 self-acting mules, containing upwards of 200,000 spindles, and that the number was likely to be more than doubled in the course of the year. One of the recommendations of this machine to the spinners, is, that it renders them independent of the working spinners, whose combinations and stoppages of work have often been extremely annoying to the masters."

[*Review of Baines' Hist. of the Cotton Manufactures.*

¶ *Water obtained by Boring.*

Artesian wells have been very successfully constructed in some parts of France. A letter from M. Jauburt de Passa, to Viscount Hericart de Thury, describes a bored well, remarkable for the abundance of water which it supplies. It was made by M. Durand, two leagues south-east of Perpignan.

The sound, after penetrating to the depth of eighty feet, through alternate beds of marl and clay, entered a bed of sandy marl, three feet thick, from which issued a jet of water, very clear, but, from the peculiarity of its taste, unfit for drinking. Its temperature was 14°.5 Reaumur, (equal 65° Fahrenheit,) and it rose from three to four feet above the surface.

A second boring, undertaken at the distance of six feet from the first, gave, at the same depth, a jet of water, but the first jet diminished, and the quantity of water from both was less than that which first issued from the former. The boring of the latter was then continued to the depth of one hundred and forty-five feet, when the sound began to sink of itself, and when precipitately withdrawn, the water rushed up to the height of five feet, and astonished all by its abundance and force. No obstacle could restrain it. No direct attempt was made to determine the maximum height to which it might rise, but fifty feet was decreed to be fully within the limits of its ascending force.

At the time the letter was written, several weeks after the first issue of the water, it continued to flow with the same violence, and with rather increased quantity. From the dimensions and velocity of the current, it appeared to supply four hundred and thirty gallons per minute, or two thousand eight hundred and eighty cubic metres per day. A leaden weight of eight pounds, supported by a string, being placed in the tube, was rapidly thrown out by the water.

The water, which at first had a peculiar taste, but not disagreeable, is now very limpid and insipid, and its temperature 66 degrees of Fahrenheit. The total expense of the well was two hundred and sixty-three francs. [*Lond. Journ.*

¶ *Painted Binding.*

Many beautiful subjects may be formed on the sides of books, by the workman skilled in painting. The volume is prepared by being paste-washed, so as to present an uniform fawn colour, the designs slightly traced, and afterwards coloured according to the pattern, the colours being mixed to the proper shade with water. The shades must be tried on pieces of refuse leather, as, being spirit colours, when once laid on, no art can soften them down, if too strong, and a peculiar lightness of touch will be necessary to produce effect. Portraits, &c., may also be executed in this manner; and many su-

perb designs have at times been executed by the best binders of this country and France. M. Didot, bookseller, of Paris, presented a copy of the "Henriade," published by himself, to Louis XVIII., most elegantly ornamented in this style. It was executed by M. Bellier, bookbinder, of Tours, and presented, on one side, a miniature portrait of Henry IV., and, on the other, a similar one of Louis XVIII., both perfect likenesses. The greatest difficulty consisted in the portraits, which were first imprinted on paper, very moist, and immediately applied to the cover, on which they were impressed with a flat roller. When perfectly dry, they were coloured with all the art of which the binder was capable, and the other ornamental paintings executed by hand. This proceeding requires great care in the execution, and will be applicable to any design where the binding will justify the expense. [*Lond. Mech. Mag.*

¶ *Indian Ink.*

An easy and expeditious method of providing a substitute for Indian ink, is to boil parchment slips, or cuttings of glove leather, in water, till they form a size, which, when cold, becomes of the consistency of jelly; then, having blackened an earthen plate, by holding it over the flame of a candle, mix up, with a camel hair pencil, the fine lamp-black thus obtained, with some of the above size, while the plate is still warm. This black requires no grinding, and produces an ink of the very same colour, which works as freely with the pencil, and is as perfectly transparent as the best Indian ink. It likewise possesses the advantage of furnishing artists with a substitute for that article, which may be prepared where it may be difficult to obtain the ink itself. [*Lond. Mech. Mag.*

List of American Patents which issued in September, 1835.

		September
521.	*Lever press.*—Jonathan Payne, Russelville, Ky.	9
522.	*Churn, and washing machine.*—Thomas Ling, Winthrop, Maine,	9
523.	*Washing and fulling machine.*—Orin D. Wade, China, New York,	9
524.	*Potters' clay, purifying.*—Adam Weber, Wormelsdorf, Penn.	9
525.	*Platform for rail-roads.*—John Tustin, Philadelphia,	9
526.	*Corn shelling machine.*—Elijah Morse, Knox county, Tenn.	9
527.	*Hydraulic cement.*—Obadiah Parker, New York,	9
528.	*Artificial stone.*—Obadiah Parker, New York,	9
529.	*Artificial stone.*—Obadiah Parker, New York,	9
530.	*Water, application of, to mills.*—J. W. Dart, and S. Wood, Fabius, New York,	9
531.	*Gum elastic cement.*—Charles Goodyear, New Haven, Conn.	9
532.	*Steam engine.*—John Bennock, Penobscot, Maine,	9
533.	*Scales for weighing.*—Jesse Marden, Baltimore,	9
534.	*Rail-road cars.*—Charles Davenport, Cambridge, Mass.	9
535.	*Dead spindle.*—Henry G. Davis, Northborough, Mass.	9
536.	*Disengaging horses.*—Gotlieb Shultz, Philadelphia,	9
537.	*Railway cars.*—Anthony Sherman, Philadelphia,	9

		September
538.	*Corns, curing.*—William Davies, Williamsburg, Virginia,	9
539.	*Coffee mill, &c.*—E. Morse and C. Putman, Knoxville, Tenn.	9
540.	*Bedstead for invalids.*—N. Richardson, Boston,	9
541.	*Saw set.*—Lewis Barrymore, Hanover, New York,	9
542.	*Stamp for post offices, &c.*—Benjamin Chambers, Washington city,	9
543.	*Supplying air to fires.*—Robert Mayo, Washington city,	9
544.	*Gauging saw logs.*—William A. Needham, Brimfield, Massachusetts,	9
545.	*Cooking stoves.*—J. Whiting and J. Mears, Boston,	9
546.	*Coopers' howel and croes.*—Melancthon Sutton, Penfield, N. Y.	9
547.	*Washing machine.*—James Lombard, Readfield, Maine,	9
548.	*Saw mill.*—Linus Yale, Utica, New York,	11
549.	*Breaking sward ground.*—Guy Gray, Industry, Maine,	18
550.	*Looms for weaving stocks.*—Conrad Kyle, Erie, Penn.	18
551.	*Tailors' measure.*—John S. Rockafellow, Hemington, N. J.	18
552.	*Beds, cots, &c.*—W. J. Lyman, and A. E. Lyman, East Hampton, Mass.	18
553.	*Plough.*—P. Stahl, and B. Diffenbacker, Northampton county, Pa.	18
554.	*Wool and flax machine.*—Wm. W. Colvert, Lowell, Mass.	18
555.	*Printing and dying woolens.*—Wm. Duncan, Belville, N. J.	18
556.	*Planting cotton machine.*—Robert T. Goodman, Ballsville, Va.	18
557.	*Corn shelling.*—J. S. Harris, Poultney, Vermont,	18
558.	*Boxes in hubs, setting.*—E. Badlam, Jr., Chester, Vt.	18
559.	*Timepieces propelled by air.*—Andrew Morse, Jr., Bloomfield, Me.	18
560.	*Dressing hoops.*—B. Kimball, A. Pevey, and F. Spalding, Peterborough, New Hampshire,	18
561.	*Cradling machine.*—Edward Badlam, Jr., Chester, Vermont,	18
562.	*Seed collector.*—D. Ashmore, and J. Peck, Jefferson county, Tenn.	18
563.	*Mill stones, dressing.*—D. B. Napier, Casey county, Kentucky,	18
564.	*Saw mill carriage.*—Samuel Phelps, Mount Morris, N. Y.	18
565.	*Propelling boats.*—J. L. Smith, Charleston, S. C.	18
566.	*Glue, manufacturing.*—Jonathan Morgan, Portland, Maine,	18
567.	*Cooking stove.*—Ezekiel Daball, North Canaan, Conn.	26
568.	*Gathering clover seed, &c.*—Hiram Holt, Weld, Maine,	26
569.	*Turning boots, machine for.*—S. C. Blodgett, and H. Boynton, Rowley, Massachusetts,	26
570.	*Cooking stove.*—P. Page, Rowley, Mass.	26
571.	*Forge.*—J. Knickerbacker, Laporte, Indiana,	26
572.	*Boilers, alarm for.*—Thomas Odiorne, Malden, Mass.	26
573.	*Chimney and fire-place.*—Moses Perin, Connersville, Indiana,	26
574.	*Grist mill.*—Owen Moses, Malone, New York,	26
575.	*Blower, spiral cone.*—Benjamin Brundred, Oldham, N. J.	26
576.	*Washing machine.*—J. J. and E. C. Milliken, Winthrop, Maine,	26
577.	*Mead.*—Theo. J. Kimball, and A. H. White, Dedham, Mass.	26
578.	*Forges, &c., air applied to.*—S. W. Watson, and C. Robinson, Ashtabula, Ohio,	26
579.	*Financiering, plan for.*—John Golder, Philadelphia,	26
580.	*Silk weaving by power loom.*—Gamaliel Gay, Poughkeepsie, N. Y.	26
581.	*Writing ink.*—John D. Myers, New York,	26
582.	*Rope and cordage.*—William Fanning, New York,	26
583.	*Turning curves on rail-roads.*—J. Stimpson, Baltimore,	26
584.	*Forming rail-road plates.*—J. Stimpson, Baltimore,	26
585.	*Shingles, shaving.*—Wm. H. Wilkinson, Wayne, Ohio,	26
586.	*Saw mill machinery.*—John Muir, Menallen, Penn.	26
587.	*Bedstead.*—Perry Prettyman, Georgetown, Del.	26
588.	*Mortising machine.*—Charles Gates, Antrim, N. H.	26
589.	*Double speeder.*—William Field, North Providence, R. I.	26

CELESTIAL PHENOMENA, FOR DECEMBER, 1835.

Calculated by S. C. Walker.

Day.	H'r.	Min.				
3	11	6	Im.	34 Tauri,	,7, N. 49°	V. 3°
3	11	42	Em.		353°	22°
4	6	14	N. App.	☽ and τ Tauri,	,5, ☽ South 2.'2	
8	9	14	Im.	λ Cancri,	,6, 124°	70°
8	10	10	Em.		232°	176°
10	11	38	Im.	α Leonis,	,3,4, 25°	28°
10	12	30	Em.		295°	242°
12	12	3	Im.	γ Virginis,	,4,5, 55°	5°
12	13	3	Em.		252°	201°
16	15	38	Im.	ν Libræ,	,6, 18°	33°
16	16	16	Em.		286°	236°
31	14	47	Im.	τ Tauri,	,5, 99°	155°
31	15	49	Em.		273°	326°

Meteorological Observations for August, 1835.

Days.	Therm. Sun rise.	Therm. 2 P.M.	Barometer. Sun rise.	Barometer. 2 P.M.	Wind. Direction.	Wind. Force.	Water fallen in rain.	State of the weather, and Remarks.
			Inches	Inches			Inches.	
1	71°	79°	29.62	29.62	W.	Moderate.		Cloudy—flying clouds.
2	59	71	.80	.80	W.	do.		Lightly cloudy—clear.
3	59	75	.76	.86	W.	do.		Clear day.
4	54	69	.90	.95	NW.	do.		Lightly cloudy—clear.
5	56	74	.95	30.00	SW. & W.	do.		Lightly cloudy.
6	62	63	30.00	29.80	N.E.	do.	0.59	Rain—cloudy.
7	56	72	.85	.85	NW. W.	do.		Clear—flying clouds.
8	58	72	30.00	.93	NW. W.	do.		Lightly cloudy—clear.
9	61	72	.00	.00	SW.	do.		Clear day.
10	60	73	29.90	29.90	S.	do.		Clear—lightly cloudy.
11	60	72	.85	.85	E.	do.	0.05	Clear—rain.
12	69	69	.80	.80	E.	do.	0.60	Cloudy—rain.
13	69	72	.80	.80	SW.	Brisk.		Drizzle—rain.
14	71	81	.80	.80	W.	Moderate.		Cloudy—flying clouds.
15	69	78	.80	.80	E.	do.	0.25	Cloudy—showers.
16	72	80	.80	.92	W.	do.	0.02	Cloudy—drizzle.
17	67	81	.80	.80	W.	do.		Cloudy—flying clouds.
18	70	78	.70	.80	SE.	do.	0.35	Clear day.
19	67	76	.75	.75	W. NW.	Brisk.	0.03	Showers—gale of wind, thund. & lightning.
20	62	76	.64	.75	W. NW.	do.	0.03	Clear—showers.
21	56	69	.70	.70	W. NW.	do.		Cloudy—rain.
22	57	69	.70	.80	W. SW.	do.		Cloudy—flying clouds.
23	54	69	.70	.80	NW.	do.		Clear—cloudy.
24	54	73	30.00	30.00	W.	do.		Clear day.
25	60	77	.00	.05	NW.	do.		Lightly cloudy.
26	67	77	29.95	29.85	W.	Moderate.		Lightly cloudy.
27	68	77	.74	.80	SE. SW.	do.	0.54	Cloudy—rain.
28	67	79	.75	.80	S. SW.	do.		Fog—light clouds.
29	67	79	.80	.90	SW.	do.		Cloudy—light clouds.
30	63	72	.90	.90	W. NW.	do.	0.01	Lightly cloudy—high wind in n't.
31	57	69	.85	.85	W.	Brisk.		Clear—light clouds. (sprnk'g rain
Mean	62.87	74.23	29.82	29.85			2.46	Clear—floating clouds.

Thermometer.			Barometer.
Maximum height during the month,		84. on 13th and 17th.	30.05 on 24th.
Minimum	do.	54. on 4th, 23d. & 24th.	29.62 on 1st.
Mean	do.	68.56	29.84